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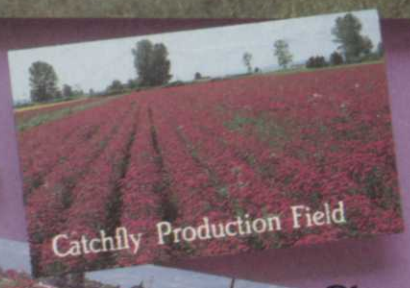

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MAY 1987, VOLUME 26, NUMBER 5

LANDSCAPE MANAGEMENT

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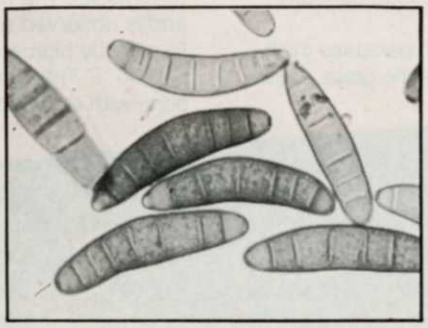

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Pythium and Snow Mold Can Ruin Your Turf.

Pythium Blight

Pythium Blight attacks all cool season turfgrasses and Bermudagrass. Normally, it is a high temperature, high humidity and wet weather disease.

Severity is greatest during periods of high temperatures (high 80s and 90s), little or no wind movement, where the grass is lush and dense and soil moisture is excessive. The disease can also be devastating with temperatures in the low to mid 60s, especially during periods such as the early Spring and Fall when high humidity and excess water are present, and during overseeding of Bermudagrass with cool season grasses in the Southern United States.

Grass seedlings are extremely susceptible to Pythium attack. Affected seedlings wilt, collapse and die (damping off) resulting in irregular dead patches in the turf. Pythium is a common cause.

General view of Pythium Blight on Rye seeding.

It happens fast

The disease first appears as small irregular shaped spots ranging up to 4 or 6 inches in diameter. These spots first appear as dark, greasy or slime water-soaked patches; the leaves soon dry out, shrivel and the color fades to a light brown or straw color. In early morning, or when the air is saturated with moisture, the leaves of diseased plants may be covered with a fluffy white mold growth, hence the name "Cottony Blight." These small spots may enlarge up to 2 or 3 feet in one day.

What to Look For

Diseased areas may coalesce to form streaks a foot or more wide. These streaks are normally caused by fungal structures that were previously washed or carried by surface water from a diseased area. Mower movement will also transport fungal structures from diseased areas to healthy areas, thereby increasing spread of the fungus. Late stages of the disease can spread very rapidly and can kill large, irregular sections of turf in 24 to 48 hours. Infected areas are light brown and usually have no pattern of spots or streaks typical of the early stage.

Gray Snow Mold

Gray Snow Mold or Typhula Blight attacks most northern turfgrasses. The disease usually develops under a snow cover and is observed as the snow melts. Fungus development is favored by high soil moisture and temperatures between 32° and 40° F. The worst attacks of gray snow mold occur in seasons with exceptionally warm wet autumns. Snow fall on unfrozen turf makes an ideal environment for the organism to grow, infect and destroy turfgrasses.

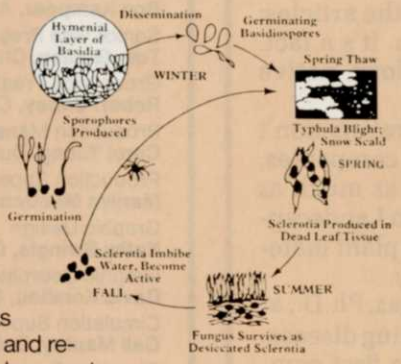
What to Look For

Gray Snow Mold is usually visible at the first spring thaw. From a distance it appears as roughly circular light yellow to straw colored dead areas 2 inches to 6 inches in diameter but may reach a diameter of 2 feet or more. Leaves soon progress to a grayish-white color, finally becoming matted together. Wet grass blades are covered with a fluffy, white to bluish-gray mold or a silvery crust that disappears as the grass dries. As the infected areas increase in size, the margins may be a darker grayish white. Under favorable conditions for disease, the spots may coalesce and kill large irregular areas of turf. Typhula Blight not only attacks foliage, but infection may move down into the crown area completely destroying the grass plant.

Typhula Blight or Gray Snow Mold

How You Can Get Control.

Use the Right Fungicide. TERRANEB SP.



Simple to use, **TERRANEB SP** provides fast-acting control over Pythium and Snow Mold. Its time-tested formula works systemically, giving you extended disease protection. It's biodegradable, has extraordinarily low toxicity, and requires lower use-rates, at less cost.

To Control Pythium Blight

Apply 4 ozs./1000 sq. ft. or 10 to 11 lbs./acre of **TERRANEB SP** when the disease first appears and repeat as needed. It is suggested that you always have some **TERRANEB SP** on hand, because Pythium Blight occurs unexpectedly, and once it appears, it can spread fast.

Good surface and subsurface drainage is essential when establishing a new area. The soil pH should be betweeen 6 and 7. Do not over-water seedbeds or established turf in hot weather. Maintain adequate, but not excessive, balanced fertility based on a soil test. Avoid over-fertilizing in hot weather with a highly soluble, high-nitrogen product. Good air circulation, light availability and thatch removal are other cultural controls.

To Control Snow Mold

Apply **TERRANEB SP** Turf Fungicide in autumn before the first heavy snow is forecast. Apply at the rate of 6 to 9 ozs./1000 sq. ft. in as little water as is needed to get complete coverage of the surface of the plant. Time and rate of application is dependent upon your geographic location and the normally expected severity of the disease. Applications in northern states would normally be made earlier and at higher rates than in the mid-Atlantic or mid-Continent states. It is important to avoid excessive nitrogen fertilizers after early to mid-autumn.

Keep **TERRANEB SP** on hand. Because when Pythium Blight and Snow Mold show up, they move fast. So should you.

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The wave of the future

■ Trends, predictions, analyses...all are an accepted part of the bar-graph business world of the '80s. The green industry isn't immune to the fortune-telling analysts. But not all changes can be calculated on a computer printout. Sometimes, change just creeps up on you.

This issue of LANDSCAPE MANAGEMENT is a good example. It contains a consistent theme echoing through most of the articles: biological alternatives. It isn't a trend or a prediction. It's a fact. The green industry is actively promoting biotechnology, native plant materials and environmental consciousness.

Our cover story on wildflowers tells it best. Naturalists don't want foreign seed polluting local gene pools. The seed companies, through extensive research, are regionalizing mixes as much as possible. The Association for the use of Native Plants in Landscaping (ANVIL) has organized in Illinois to promote using plant materials which are drought-tolerant and conserve energy.

The cool-season turf disease guide by Joe Vargas, Ph.D., at Michigan State looks at biological methods for controlling disease. "Jobtalk" (next month) reviews Agri-Diagnostics, the first company to develop a turf disease detection kit which works with biotechnology. We even received a letter recently from a man who pointed out the differences between weeds and native plants.

Biotechnology has infiltrated the green industry. It not only has changed disease detection and turf management, but plant breeding, as well. Dr. Bill Torello at the University of Massachusetts is developing seed containing endophytes (insect-resistant fungi) through tissue culture cloning.

Chemicals are by no means obsolete. Nor will they be in our lifetime. Nor should they be. Despite the media-incited controversy, chemicals, when used properly, benefit us all. Disease would be rampant today if chemicals hadn't been developed to kill off pests. Without chemicals, food production would be minimal, and our definition of a "beautiful" landscape would be greatly changed. Chemicals provide a high standard of aesthetics.

Despite the apparent conflict, biotechnology and chemical companies aren't arch enemies. They have a mutual respect for each other. Most chemical companies have researchers studying biotechnology. The applications are phenomenal.

Biotechnology is truly the wave of the future.

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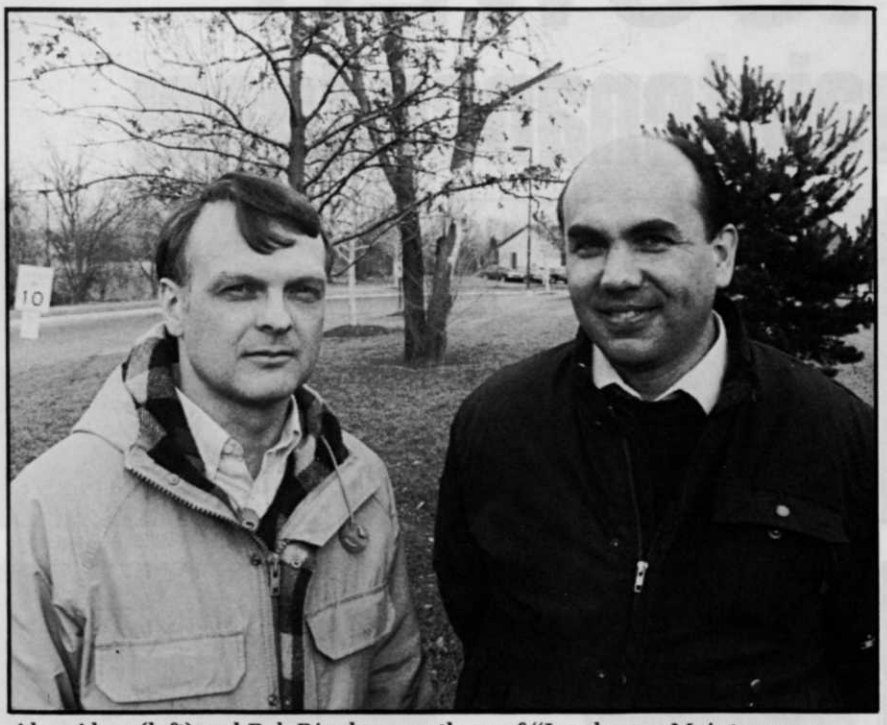


Alan Almy (left) and Bob Rinck, co-authors of "Landscape Maintenance Guide," the first manual of its kind in the country.

REFERENCE

Housing Authority develops guidelines for management

The Michigan State Housing Development Authority (MSHDA) has developed a two-volume "Landscape Maintenance Guide" which is being distributed to landscape contractors involved in MSHDA projects. This guide is believed to be the first of its kind in the country.

"This is a practical manual that can be used on a daily basis," says Bob Rinck, who co-authored the guide with Alan Almy. "It can apply to anyone who does multi-property sites. We're bordering on areas that other people haven't even touched."

Rinck says that 250 copies have been distributed free and that some colleges and design offices have also expressed interest in obtaining copies. A hardiness zone/climate/maintenance chart comes with the guide.

The guide has served to help strengthen the role of the landscape architect as a team leader among development owners, managers and tenants in maintaining quality housing, Rinck and Almy note.

For more information, contact Rinck, environmental review officer, or Almy, landscape architect, at (517) 373-2001. Address is 401 S. Washington Square, Lansing, MI 48909.

RESEARCH

An answer to anaerobic black layer?

Sulfur causes black layer in sand greens, according to researchers at Michigan State University. Black layer is a layer of anaerobic material found at the same level throughout a green.

Joe Vargas, Ph.D., of Michigan State University says theories on black layer attributed it to algae, root dysfunction and excessive water. But his current research shows sulfur to cause the problem.

"Yes, you see algae, but it comes in after the layer is already formed," Vargas says. A rotten egg-like odor will most likely indicate a black layer problem.

Excessive sulfur can get into the green by using water with a high sulfate content or treating a green with sulfur to help balance the pH level. It appears that acid rain also adds to the problem.

Joe Vargas, Ph.D.

The combination of too much sulfur and saturated conditions usually leads to black layer. "You can be most frugal at watering, but then you'll get rain," Vargas says. "Don't mess with sulfur."

Vargas says that sulfur-coated urea products "probably won't release sulfur quick enough to cause a problem." Researchers plan to study potassium and iron sulfate products and those products containing sulfide in the future.

Vargas released his findings at the Reinders Turf Conference in Milwaukee, Wisc.

INDUSTRY

ChemLawn reaches agreement on merger

A merger agreement has been reached between ChemLawn Corp. and Ecolab, Inc., St. Paul, Minn.

Ecolab will buy all outstanding shares of ChemLawn for $36.50 each in cash, ChemLawn officials said. The deal is worth $370 million.

ChemLawn originally was the target of a takeover attempt by Waste Management Inc., Oak Brook, Ill., which offered $33 then $35 per share.

ChemLawn rejected the Waste Management bid, then told its banker to seek other possible buyers.

ChemLawn had filed suit for a preliminary injunction from the federal court in Columbus, Ohio after the initial bid, claiming that Waste Management failed to disclose in its tender offer an alleged history of environmental misconduct.

Waste Management officials view the lawsuit as a ploy to use the legal system to delay a tender offer.

INSURANCE

Fiberoptics cables create havoc in the turf and landscape industries

The fiberoptics concept may be revolutionary in the telephone industry, but it's giving landscape managers a headache. Fiberoptics has made it almost impossible for landscape contractors to get underground insurance.

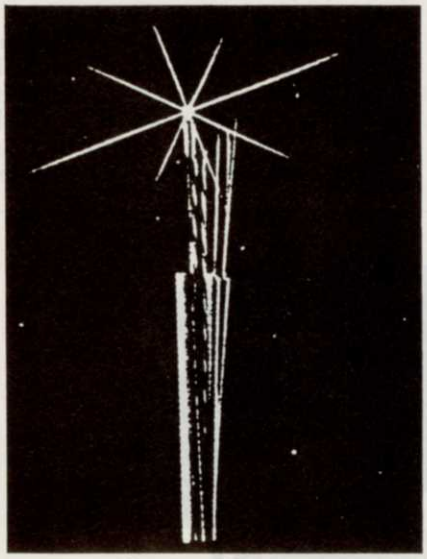
"The problem is that fiberoptics cables can't be spliced," says Jim Leatzow of Financial Guardian Insurance. "You have to dig up several blocks to put in a new one."

Fiberoptics cables are buried only 18 inches underground and can be cut with a shovel.

Leatzow says that some landscape managers may think they are covered, but really aren't. If the letter "U" appears on your policy it means you are *not* covered for underground. A letter "X" stands for explosion and "C" for collapse. When the letter appears, the company is *not* covered.

Landscape contractors are particularly hurt by the insurance crisis. But Leatzow says he never hesitates to issue a policy to a design/build firm: "Landscape contractors will fix a problem before it explodes," he says. "I think it's the best of situations, although the rest of the industry is fearful."

In looking for a good policy, Leatzow says to ask an agent to:



- provide more than one quote;
- assist you in identifying your prime areas of risk; and
- provide unique coverage.

To reduce the cost of your insurance program, Leatzow recommends:

- lowering coverage limits;
- accepting higher deductible;
- joining trade associations; and
- getting brokers and insurance companies involved.

Leatzow spoke at the Landscape Expo in Chicago, Ill.

Manager of the Year

Michael Hugg (center) accepts congratulations and a plaque from Jeffrey Bourne (second from left), president of the Professional Grounds Maintenance Society for being named PGMS/LANDSCAPE MANAGEMENT "Landscape Manager of the Year." Also shown (left to right) are LM group vice president Bob Earley, LM editor Jerry Roche and PGMS executive director Alan Shulder. The award was presented during the Landscape Expo in Rosemont, Ill.

1-2-3

Though state EPA regulations have not yet been standardized, towns like Paramus, N.J., have been taking the initiative on safe pesticide storage.

"The town is a forerunner in concerns for residents," says Ed Walsh, superintendent at Ridgewood Country Club.

About two years ago, the town began a chemical awareness program for residents. Part of the program required businesses that stored chemicals, even at low levels, to register for a permit. Walsh says that is not necessarily bad—in fact, it actually helped him.

Inspectors found the club's storage facility unacceptable, forcing the construction of a new facility. Walsh intended to build one soon anyway. This just gave him a good way to get funding for it.

The facility was built under recommendations from George Stanton, a chemical safety engineer. Specifications:

1. Two-thirds of the 1000-square feet, used for fertilizer storage, is unheated.

2. The other compartment is separated by a brick wall. It contains the pesticides, and is well ventilated and heated.

3. The floor on the heated side is six inches below the door sill to prevent seepage if a spill occurs.

Walsh believes his building will be up to standard. The only possible addition he foresees is a concrete apron about six to 10 feet out from the building surrounded by a two-foot-high wall to prevent seepage.

Walsh hopes that, if and when EPA regulations are standardized, engineers like Stanton will work with EPA.

INDUSTRY

Immigration laws spawn new programs

New immigration legislation aimed at reducing the number of illegal aliens in the U.S. is causing employers to scramble for ways to maintain their workforces.

The new law requires employers to fill out an Employee Eligibility Certification (Form I-9) for every person hired after November 6, 1986, and for all those hired in the future.

The form must be signed by the employee within 24 hours after beginning employment and kept on file three years or one year after the end of employment, whichever is longer.

Failure to follow these procedures can result in fines from $100 to $1,000 per employee after June 1, 1987. The law makes it illegal to hire illegal aliens.

As a result, Apprentice Programs are being administered through organized and regulated processes to train replacement workers or finish training illegal aliens as they become naturalized. (Amnesty programs to legalize unauthorized aliens are part of Immigration Reform.)

The Landscape Horticulture Center for Personal Development has submitted apprenticeship standards to the Bureau of Apprenticeship and Training for landscape technician and landscape management technician.

The landscape technician program is a two-year or 4,000-hour program while the landscape management program takes one year or 2,000 hours. Both programs require on-the-job training and 140 hours of classroom training, which is not paid for by the employer.

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AWARDS

Groups honor Butler for industry service

Jack Butler, Ph.D., from Colorado State University, was honored for his years of service with a roast by a number of industry groups at the most recent Rocky Mountain Turfgrass Conference.

The Rocky Mountain Turfgrass Association, in conjunction with the Rocky Mountain Golf Superintendents, the Professional Lawncare Association of Colorado and the Rocky Mountain Sod Growers, surprised Butler with the roast at its annual banquet.

Graduate students, former students and industry colleagues participated in the roast. In addition, the associations presented Butler with a watch and a trip to Hawaii for him and his wife Dianne.

PEOPLE

Lawn Institute co-founder dies

Robert W. Schery, Ph.D., died at home in Marysville, Ohio, on March 18th. Schery was founding executive director of The Lawn Institute and a nationally-recognized turf authority.

Schery served as liaison between The Institute and technical specialists at the nation's universities for more than 30 years.

"Bob was a real pioneer," said Eliot Roberts, Ph.D., Schery's successor at The Lawn Institute. "When he came into the turf picture in the 1950s, common-type grasses were in use. Bob Schery was instrumental in orchestrating a shift into the development of proprietary turfseed.

"He was the spark behind making a lot of things happen behind the scenes."

Schery, a Missouri native, received his doctorate from the University of Washington. His books include "A Perfect Lawn" and "Lawn Keeping." Schery also contributed to the "Ency-

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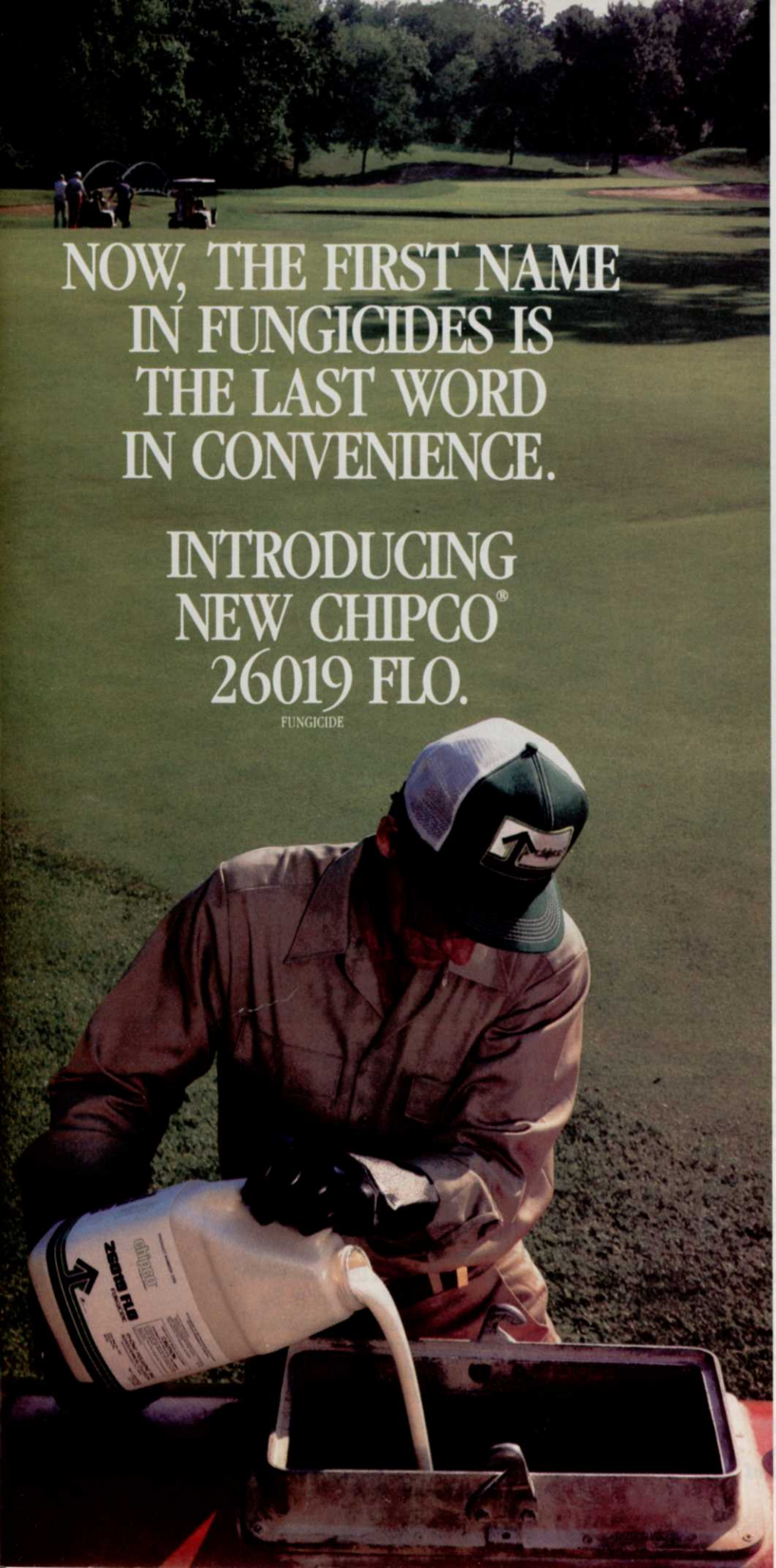

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Optional mid-mount rockshaft control lets you raise and lower mower deck without disturbing 3-point hitch mounted tools.

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SHORT CUTS

DIFFERENT GROWING... Four companies from the green industry made it into *Inc.* magazine's recently-published 1985 list of the 500 fastest growing private companies in America. Barefoot Grass Lawn Service, Worthington, Ohio, placed 224th. Suburban Landscape Associates, Davenport, Iowa, entered at 312th place. Ford's Chemical and Service, Pasadena, Tex., placed 447th, while the golf course construction firm Landscapes Unlimited, Lincoln, Neb., placed 473rd. The magazine bases its selection on a company's growth percentage over five years, with a sales ranging from no less than $100,000 the first year and no more than $25 million the last year. In addition, each company must be independent and privately owned.

COMMEMORATIVE COLORS... As part of the bicentennial celebration of the September 17, 1787 signing of the U.S. Constitution, Bicentennial Chairman Warren Burger is encouraging communities to plant "Constitution Gardens." They are intended to be a lasting tribute to the freedom the Constitution has brought the country.

Bedding Plants, Inc. is offering a free brochure to help design and plan the garden. The organization is encouraging garden planters to use red, white and blue flowers. The brochure lists 10 or more varieties of flowers of each color, as well as tips on planting. For a copy of the brochure, send a self-addressed, stamped business-sized envelope to Bicentennial, Bedding Plants, Inc., 210 Cartwright Blvd., Massapequa Park, NY 11762.

MAKING A GRADE...A new 16-page, four-color bulletin titled "Athletic Field Construction and Maintenance" is being made available to the green industry by the University of Minnesota Agricultural Extension Service. The booklet was written by D. H. Taylor, G.R. Blake and D.B. White. For copies, send $1 to: Distribution Center, Extension Service, Coffey Hall, University of Minnesota, St. Paul, MN 55108.

PULLING OUT THE RUG... Howie Newman, a Boston-area sports writer, wants to get rid of artificial turf. He's started a nation-wide campaign called "Pull Out The Rug," to get support for doing away with synthetic surfaces. He's even distributed the song "Astroturf" to radio and television stations upon request. To support his efforts, "Pull Out The Rug" kits (bumper sticker and newsletter) are available by sending $2.50 (three kits for $6) to Howie Newman, 20 Hartshorn St., Malden, MA 02148 or call (617) 397-0384.

SHOP-AT-HOME?...A growing trend in the green industry is shop-at-home services being offered by some distributors. One New York company, Landscapers Supply, sells power equipment, engines, parts and accessories by phone. For more information, see the "Miscellaneous" heading in this month's classified section.

SCHERY *from page 8*

clopedia Brittanica," "Encyclopedia Americana" and the "World Book."

During and after his employment as botanist for the Monsanto Co. and O.M. Scotts & Sons, he was a member of many professional organizations.

Schery spent five years in retirement from The Lawn Institute before dying of cancer at age 70.

CHEMICALS

Spraying moratorium does harm, not good

A month-long moratorium on spraying for aquatic weeds on Lake Okeechobee in south Florida imposed last August did more harm than good, says Kenneth R. Tefertiller, Ph.D., of the Institute of Food and Agricultural Sciences.

The moratorium was not based on known research data, he said at a recent Florida House Appropriations Subcommittee hearing. Tefertiller, vice president of agricultural affairs at the University of Florida, was speaking on behalf of IFAS during budget hearings.

The moratorium was imposed over concerns about blue-green algae blooms on the lake caused by too much phosphorus. Spraying had killed hyacinths, which, when dead, sink and release phosphorus back into the water.

Halting the spraying did not reduce the levels, Tefertiller said, but instead allowed hyacinth growth the chance to get a head start. He added that more chemicals would be needed to control the hyacinth, at an added cost of $100,000.

A grant from the South Florida Water Management District, which manages spray programs on the lake, to the IFAS Center for Aquatic Weeds will be used to write a white paper on "lessons learned from the moratorium," Tefertiller said.

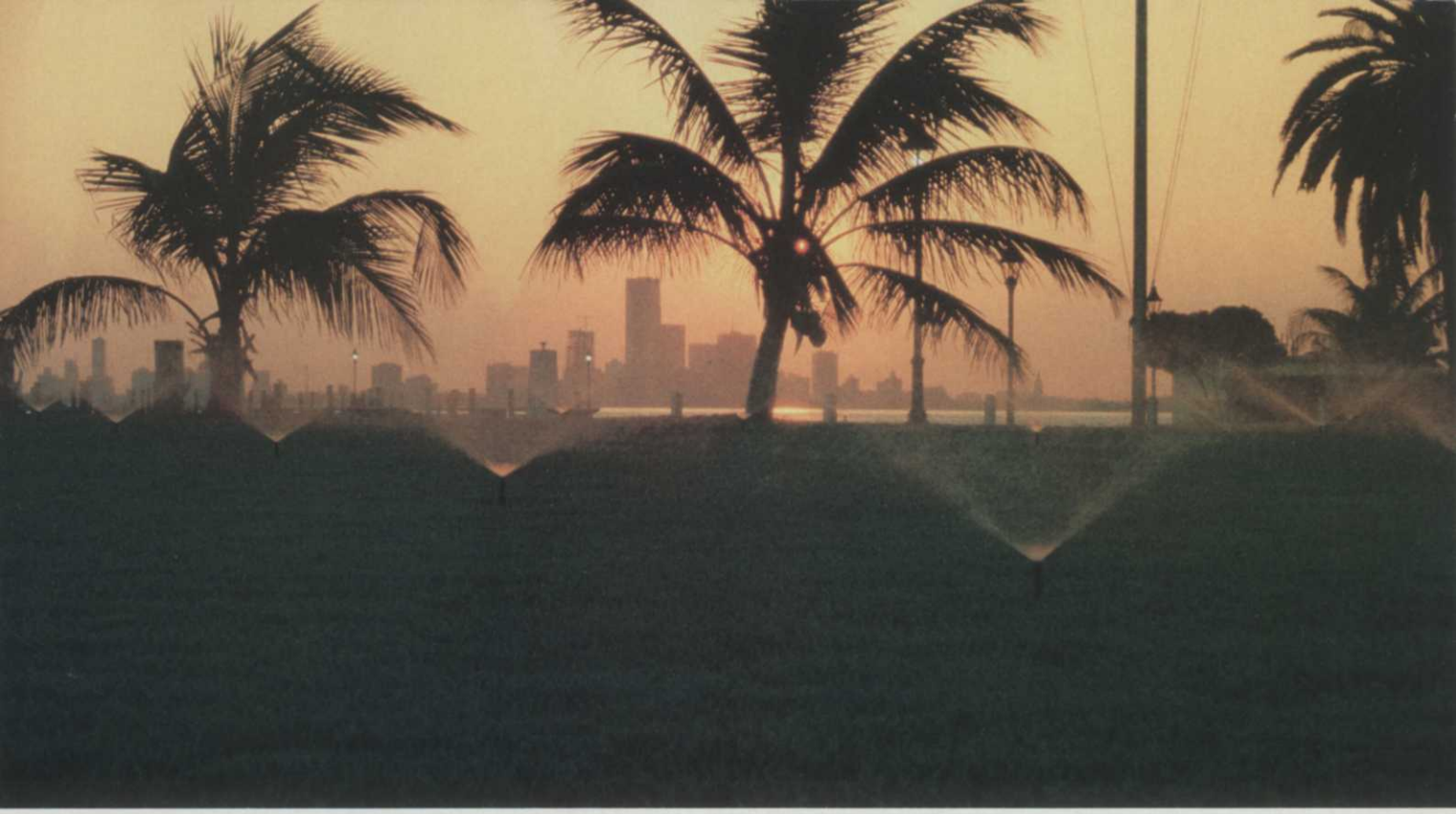
ASSOCIATIONS

Video shows benefits, safety of lawn care

A nine-minute video about the safety and benefits of professional lawn care service has been produced for the Professional Lawn Care Association of America by the Ciba-Geigy Corp.

"Common Sense Answers to Turf Care Questions" is intended for use by LCOs to be presented at local community group meetings of regulators, chambers of commerce and other such groups.

The video features PLCAA's Jim Brooks and Gary Clayton, Virginia Tech professor John Hall, III and commercial real estate expert John McCracken of McCracken and Associates, Inc.



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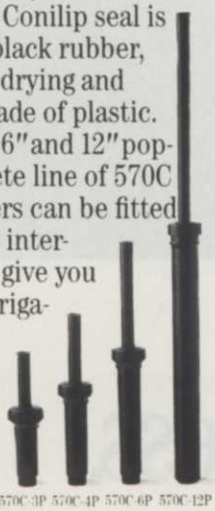

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Other accessories include risers, shrub adapters, micro spray adapters, extenders and funny pipe fittings. Toro's check valves minimize low head drainage and puddling after the sprinkler system is turned off.

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If you'd like more information on the 570C Series, please contact your local Toro dealer, or Toro directly at 5825 Jasmine St., Riverside, CA 92504. (714) 688-9221.

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COVER STORY

GOING WILD

by Heide Aungst, managing editor

The Vintage Club uses wildflowers in "desert scenes" bordering the golf course.

Each spring an earthly rainbow of wildflowers sweeps across fields renewed with life. Walking into a blooming meadow compares only with opening a new 64-crayon Crayola box as a child.

But while those mystical hues have spell-bound nature-lovers for centuries, they've only recently sent seed companies in search of the pot of gold. Wildflower mixes have become popular, and profitable, in the last few years.

Superintendents use the mixes in roughs; home-owners cultivate wildflower gardens; and highway departments scatter the seed on low-maintained rights-of ways. But despite their popularity, naturalists argue that mixes don't offer a crayon-box color solution in low-maintenance areas, but open a Pandora's box of problems.

"There is a potential for the local gene pool to become polluted," says Brian Parsons, naturalist at the Holden Arboretum in Cleveland, Ohio. "That's one argument for each state to develop its own nurseries as far as roadsides are concerned."

Natives vs. mixes

Native wildflower varieties demand less water, Parsons explains. "Using native wildflowers in the landscape conserves energy and fuel by reducing mowing," he says. "Many mixes use European species which aren't regionally adapted. It's a quick show, but color won't persist in the landscape after the first couple of years."

"Very few people know which species grow in what areas," says Crystal Rose Fricker, plant breeder with Pure Seed Testing, Inc. "We're doing research on natives. With grasses you know what's a cool-season or warm-season grass. But there are many species of wildflowers widely adapted to different areas. I think we're just learning."

Most seed companies market mixes to regional areas. Lofts and Jacklin share the name and advertising for their Pinto wildflower mix, but Jacklin markets only a Northern mix. Loft's research agronomist Marie Pompei says the company has five different mixes: Northern, Southern, Canadian, Tropical and Texarkana.

Applewood Seed Co. in Arvada, Col. has nine regional mixes. Pickseed West, in Tangent, Ore., custom mixes seed depending on what distributors want, says Jerry Pepin, Ph.D. Most seed companies are willing to custom-mix large orders.

Despite the regionalization of mixes, the real controversy persists over what the mixes contain. The myth is that a mix will bloom full color year after year. But whether that will happen depends on how many annuals and perennials are in the mix. Both Parsons and Fricker agree that

Wildflower mixes are a popular low-maintenance alternative on rights-of-ways, golf courses and home gardens. But before you go wild with color, seed companies say it's important to learn about the mixes.

it's a matter of public awareness.

"If a mix has 25 species, it's not realistic to think that all 25 species will bloom," says Annie Paulson, resource botanist at the National Wildflower Research Center in Austin, Tex.

Annuals vs. perennials

"It depends on what the customer wants," Fricker says. "With an all-annual mix, you'll get color the first season, but it will die out. With an all-perennial mix, you won't have annuals dying out, but you won't get color until after the first winter."

Fricker explains that perennial wildflower seeds must *vernalize*, which means the seed must go through short day length and cold temperatures. "It's the plant's way of saying, 'I know if I flower too soon, the seed won't make it through the winter.'"

A solid wildflower mix will include annuals, perennials, biennials and tender perennials, which are annuals that can survive mild winters. "It's advisable to see a species list and it's possible to ask for a percentage breakdown," Paulson says.

Loft's and Jacklin's Pinto mix is primarily composed of annuals. Tee-2-Green's Bloomers and most of Applewood's mixes are about 50-50. Pickseed West's Flowers 'N' Flowers is about 60 percent annuals, 40 percent perennials.

"Using more annuals holds the cost down and gives the customer something the first year," Pepin says. He adds that some annuals will re-seed if the wildflower area is mowed in the fall.

A compromise

Illinois has reached a compromise between mixes and native species. The state is one of the few to use native prairie grasses and wildflowers along its highways. It also is home to the Association for Use of Native Vegetation in Landscaping (ANVIL).

LaFayette Home Nurseries is one of several Chicago-area nurseries which markets both mixes and native species. Sales manager Roger Lemke, who is also on ANVIL's board of directors, says mixes serve a purpose despite their problems.

"We use those mixes and include them with our mixes," Lemke says. "The annuals give color until the native perennials start coming on."

continued on page 20

Weeds can be a problem in wildflower mixes.

A BLOOMIN' SUCCESS

Members at Onwentsia Club enjoy the native prairie and wildflowers in the roughs.

Green. Golf courses are just too green. But the solution is merely a rough away: wildflowers.

Wildflowers add the needed touch of color and touch of class to any golf course. But superintendents are using them in different ways.

One perspective

The Vintage Club in Indian Wells, Calif. has used wildflowers on the golf course's edges since it was built in 1979. Of the 360 acres on the 36-hole course, about 15 are wildflowers.

Don Pakkala, director of turfgrass management, says he usually buys individual seed and mixes it on site. Last year, however, he used Lesco's Southwest mix.

The mix includes both annuals and perennials. But he finds it necessary to re-seed annually. "Some years the pe-

continued on page 20

WILDFLOWERS *from page 19*

Low maintenance?

Another myth concerning wildflower mixes is that once planted, they need no further maintenance. "How wildflowers are maintained does make a difference," Fricker says. "Some weedy species can take over."

Because of this, Fricker is working closely with chemicals companies on herbicides which kill weeds, not wildflowers. For the past three years, Pure Seed has been looking at about 50 different chemicals and hundreds of wildflower species. "We also have 15 trials going on throughout the U.S.," she says. "We want to see which species will be hurt and which will survive."

Of some 25,000 species of wildflowers, only a fraction have been seriously studied.

Fricker has researched wildflowers for five years. Pure Seed Testing has 250 acres of more than 300 varieties.

The National Wildflower Research Center has been researching wildflowers since 1982. Lady Bird Johnson founded the non-profit center for the purpose of promoting wildflowers in public and private landscape design.

Of some 25,000 species of wildflowers, only a fraction have been seriously studied.

Current research includes looking at various seeding techniques, such as a modified drill seeder, and putting together a seedling identification booklet. The center also serves as a clearing house for information, such as fact sheets done by state. Last year, more than 24,000 inquiries poured into the center.

"We're often the first place someone will turn to," says Paulson. The center won't endorse mixes, but will give recommendations concerning what to look for in a mix.

Popularity blossoms

Popularity of wildflowers has more than blossomed over the past five years. "We've gone from selling a few

continued on page 22

Jerry Pepin: Sales are booming

Marie Pompei: People want to be different

Onwentsia superintendent Paul Boizelle says using wildflowers in the rough takes planning.

A BLOOMIN' SUCCESS *from page 19*

rennials are weaker and we re-seed," Pakkala says.

Pakkala uses the wildflowers in beds he calls "desert scenes," bordering the golf course. The flowers bloom during the winter, but the hot dry Palm Springs summers make it difficult to keep them alive.

The beds all contain manual irrigation heads for water. "In the spring we slowly cut back the water so as to not shock the plant," Pakkala explains. "We have other desert plants, such as cacti, in the same beds, and they can't handle the water."

Weeds are another constant problem. "Our members and guests are purists. Sometimes we get a bed so weed-infested that we have to eradicate the whole bed," he says. "Weeds germinate with the wildflower seed. It's quite a job keeping them out."

If weeds aren't taken out, clover and thistle can shade the flowers, stunting their growth. He uses the herbicide Fusilade which gets rid of grassy weeds without damaging the flowers, but his crew must hand-weed other types.

"It's a tough situation," he says. "I need to do more research and find out what types of wildflowers will grow naturally here."

Despite the problems, Pakkala whole-heartedly recommends wildflowers to other superintendents. "By all means do it," he says. "They are low-maintenance in other areas of the country. In non-use areas, you don't have to mow as often."

A different perspective

The Midwest, unlike the Southwest, is known for its native prairie and wildflower species. Paul Boizelle, superintendent at the Onwentsia Club in Lake Forest, Ill. has used prairie and wildflowers in his roughs for five years.

Boizelle has experimented with three different techniques to plant the wildflowers. About 13 acres of the 200-acre course are planted in prairie.

The first year Boizelle let the rough grow wild. "Lo and behold we had wildflowers volunteer which had been there since the course was built in 1894," Boizelle says. "We were so excited about it."

The species had not had a chance to thrive because of the maintenance of the rough area.

"We started with five acres," Boizelle explains. "In the fall, we mowed the area using a large woods-rotary mower. Then we hydroseeded a wildflower mix on top of the stubble. We knew the seed had to find its way into the soil."

In the spring of the third year, Boizelle went in and burned the area. Controlled burning shocks the plant to provide renewed growth. It also eliminated vegetative competition of

continued on page 22

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WILDFLOWERS *from page 20*

hundred pounds to into the tons," Pepin says.

"I think it's a growing self-awareness of our environment," says Gene Milstein, president of Applewood. "People are aware that there's a limited amount of wild country left. They want to tie into that and have a piece of it in their backyard."

"It has a nostalgic theme for the homeowner," Pompei says. "Instead of being like everyone else, they can be different."

One of the most popular uses of wildflowers is for highways. Paulson recommends planting wildflowers at visible exchanges, rather than in long strips where they might be distracting to drivers.

Golf course superintendents use wildflowers in the rough or in gardens near the clubhouse. Pompei says surrounding parking lots is a new popular use for wildflowers.

Pepin says his mixes are most popular among landscape contractors. Milstein reports his all-perennial wildflower sod is most popular with home owners. "We've had an overwhelming response from consumers and the media," Milstein says. "It's totally amazed us."

Wildflower innovations

Applewood has been a leader in innovative wildflower use. Besides being the only company to market wildflower sod, they have a Super Short mixture of annuals and perennials which won't grow more than eight inches.

Tee-2-Green has a unique Designer Kit, which keeps seed varieties separate so the landscaper can plant flowers in rows according to height or color.

Pickseed West offers a Flowers 'N' Grass mix which includes 15 percent wildflowers and 85 percent Azay sheep fescue. The mix can be used for soil stabilization and erosion control on slopes.

Likewise, the Pinto mix is marketed in a Meadow variety for northern states which includes four pounds wild flowers to 26 pounds sheep fescue.

Before investing in a wildflower mix, the experts recommend consulting someone familiar with various annual and perennial species. Also, contact someone in your area who has successfully used wildflowers.

It may take some effort, but the explosion of color will be worth it. **LM**

BLOOMIN' SUCCESS *from page 20*

herbaceous plants which compete and shade the flowers. He now burns the area at least every other year.

Because of the success of the five acres, Boizelle decided to put wildflowers on eight more acres. This time he followed basically the same steps, mowing the area to stubble, but rather than hydroseeding, he used a special wildflower seed drill. "Wildflower seed comes in so many shapes and sizes that it needs a special drill," Boizelle explains. "It's really a breakthrough."

This year, he's trying a third method on six additional acres. He has gone in with Roundup to kill all existing vegetation. Then he plows and discs the area to prepare the seedbed, then drills in the seed.

"I think all three methods are acceptable," Boizelle says. "I have reason to believe the third way is going to be the best way."

A fourth method, which Boizelle has not used, is to purchase wildflower plants, rather than seed.

The species had not had a chance to thrive because of the maintenance of the rough area.

The roughs aren't completely flowers. Some parts of the prairie are non-flowering, like Big and Little Blue Stem. He has moved some of those native plants into roughs where they haven't grown in naturally.

But, he warns, even in the Midwest where wildflowers prosper, it takes some work. "Don't expect a panacea of color," he says. "It could take years to achieve the ultimate goal. You don't wave a magic wand, sprinkle seed and say presto. You have to plan ahead and budget for the project each year."

His members love the new roughs. "They're delighted," he says. "One reason we've introduced the wildflowers is to replace weed growth with beauty."

That beauty is no wonder wildflowers are such a popular way to break up the green monotony of golf courses.

—Heide Aungst

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Circle No. 103 on Reader Inquiry Card

ON THE R.O.W. AGAIN

With warmer weather, rights-of-way managers are getting back outside. They must cope with everything from managing roadside vegetation to managing their employees.

by Jeff Sobul, assistant editor

A LANDSCAPE MANAGEMENT survey of roadside and rights-of-way vegetation managers reveals that, on the average, respondents manage 3,492 miles of roadside with an average of 73 full-time employees. And nearly all of the respondents will be mowing all or parts of those roadside turf areas to some extent during the year. The lucky ones will mow just once or twice, but many will be mowing up to once a week.

About 83 percent of the respondents will control weeds in some way. About 74 percent are also involved in tree maintenance. Two-thirds of the respondents will be seeding or sodding this year; 60 percent will be doing some form of erosion control or reclamation. Not surprisingly, only 31 percent will be irrigating their roadsides this year.

If it's not one thing. . .

...It's another. Roadside vegetation managers will be dealing with a myriad of problems, as they do every year. (One poor soul dealing with 42,000 miles of roadsides with just eight full-timers has problems "too numerous to mention," and he is trying "everything" to deal with them.)

The most common problem facing the managers is dealing with weeds and other vegetation. One such manager in the Midwest responds that he is "having a lot of trouble controlling Canadian thistle and leafy spurge." To solve it, he will probably "struggle, and after three plays, punt."

A regional landscape architect in the Northeast has a different problem: every year since 1957, his state has issued a herbicide manual, but applicators are still making decisions contrary to overall planning.

Yet another landscape supervisor doesn't have enough time for him and his four-man staff to spray his 1,500 miles of roadside. He is forced to spray early each season and work different hours to avoid wind problems and traffic in some areas.

Other problems arise from having improperly or untrained applicators. A number of respondents note that a training program is necessary.

PGRs spreading

One trend noticeable from this survey is related in one way or another to mowing. Sixty percent of survey participants from across the country are using plant growth regulators either on an experimental basis or regularly, some as often as once a month.

One roadside manager in the Northwest is stepping up his application frequency in an attempt to eliminate mowing in two of his districts. While some are using PGRs to reduce mowing frequency, others are using it in areas inaccessible to mowers.

Many of the roadside managers see this increased use as a trend which will continue for a number of years at least. Another trend related to this, many participants note, is a need for better spray equipment. Respondents expect to see better calibrated equipment soon, as well as more effective, and more selective chemicals to put in them.

Unfortunately, one unlucky respondent, a public pesticide operator in the Northwest, could see no use for the new equipment because, he complains, "our county commissioners have just banned practically all spraying!"

For him, and the other roadside managers waiting for improvements, but who need help now, the following profiles may be of some assistance. **LM**

"OUR GOLF COURSE HAS TWO PROS. I'M ONE OF THEM. THE OTHER IS OUR WOODS RM 90."

Mr. Tim O'Leary
Member—Wilson Sporting Goods
National Advisory Staff
Part owner, general manager, and pro
Lost Nations Golf Club
Dixon, Illinois

After 15 years at the same golf complex, Mr. O'Leary has come to the conclusion that their two year old Woods RM 90 is, "far superior to any type of mower…including reels. It mows weeds and grass under wet or dry conditions, and the maintenance savings alone paid for the mower in the first year."

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MAKING THE GRADE

A state-approved program was developed by the Virginia highway department to train potential chemical applicators for the state tests.

by Jeff Sobul, assistant editor

Two years ago, the Virginia Department of Transportation decided it needed better trained chemical applicators to work along its roadways. The idea was to get safer chemical applications with a better public image.

Therefore, the highway department petitioned for and got approval to administer its own applicator training program. Criteria for the program, which involves training for the state department of agriculture core manual and spray certification tests in Category 6 (rights-of-way) and Category 3 (ornamentals and turf), are actually a bit more stringent than the state's.

"We had a keen interest in safety and preserving the right to use herbicides," says Boyd Cassell, landscape coordinator for the state. "In the mid-'70s, we realized the sensitivity of using the pesticides on rights-of-ways to special interest groups, adjacent landowners and what have you. We had as much concern for the safety of our employees and water, too.

"So one of the first things we did was to make it our policy: one, we won't spray in front of someone's property if they don't want us to; and secondly, we think the secret to safe application and not getting bad publicity is to properly train personnel. In that regard, all of our applicators have to be certified as commercial applicators, meet regulations, and go beyond regulations."

As a result of the training

continued on page 29

Virginia is for flower lovers

Fourteen years ago, the Virginia Department of Transportation participated in a highway beautification program called "Operation Wildflower," created by the Federal Highway Administration with the support of the U.S. Department of Transportation and the National Council of State Garden Clubs.

The idea was to plant thousands of wildflowers along the nation's highways in hopes of making them a more pleasant place to drive. Unfortuntely, in many states the program did not take root and grow.

In Virginia, however, the program has "blossomed."

Root establishment

The program developed as a joint operation between the state highway department and the Virginia Federation of Garden Clubs.

Things started with the garden clubs buying a few hundred pounds of seed, helping select species and participating in the first plantings at the sites, which were spread around the state's nine highway districts.

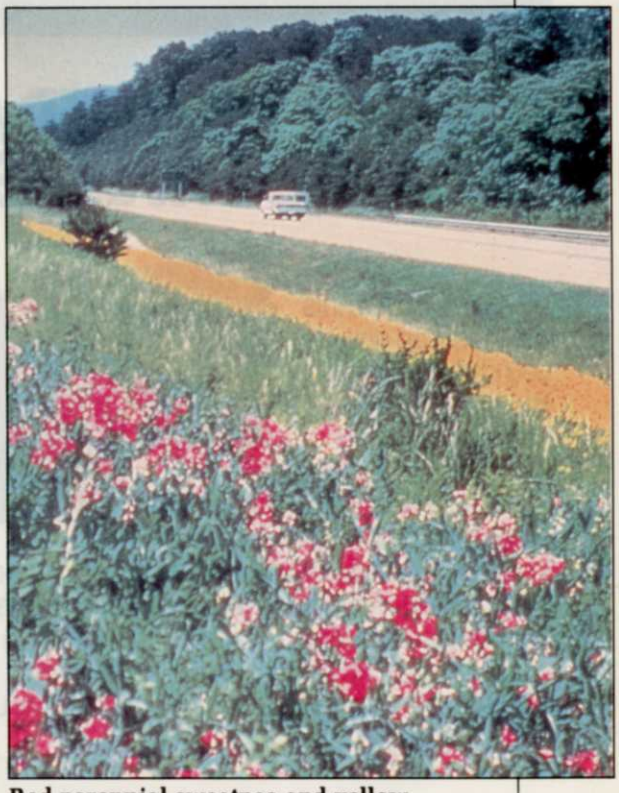
The sites, 24 at first, were prepared by eliminating competition either by fumigation or applications of Roundup, and heavy disking or cultivating to prepare the ground for planting.

Today, at more than 60 sites, wildflowers are coming in naturally. "Considering what we're planting and what's coming in naturally, we've got some nice scenes of wildflowers," says Boyd Cassell, the highway department's landscape coordinator. "We have directives out not to mow these (planted) areas where they're coming in naturally."

"What we're planning to do," says landscape specialist Philip Baker, "is create a master map of the state showing the primary routes on the interstates with areas where we have planted certain species."

This, adds Cassell, "maybe will be an additional tourist at-

continued on page 29



Red perennial sweatpea and yellow coreopsis line parts of Virginia's Interstate-81 north of Salem.

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MAKING THE GRADE *from page 27*

program, which landscape specialist Philip Baker administers, the state has about 350 certified applicators in its nine districts. "The programs generally last from one to two days," Baker says. "We have recertification, and most of the time, certification for the first time.

"Basically what we do is set up a program which entails safe use of pesticides." Baker, who is a horticulturist, adds that the program addresses areas such as calibration and target vegitation. "We use a series of class discussions, lectures, videos and slide tapes," he explains.

Once a potential applicator passes the test on the core manual administered by the state, he is eligible to take tests in Categories 3 and 6. "We review the manuals and give them a (sample) test," Baker notes. "Then we can get an idea of what we're dealing with. If it requires additional training for those people to get them prepared for the actual test that is given by the state department of agriculture and pesticide regulators then we do so."

'By employees having a better understanding of what they're using and the purpose that they're using it for, as far as complaints, we had virtually none.'

—Philip Baker

"Before, we had to rely on universities and extension agents for training," Cassell adds. "We had to get our training for certification and recertification at the whim of someone else. This way, we can do our own planning and do it during the off season so when the season gets here, we're ready."

The training program has been set up so that it can be administered separately in the nine state districts, saving time and money in the process.

"We found that not only does the program help tremendously in passing the test, it also gives them a background and understanding of what they're dealing with," Cassell comments.

The program has more than just a positive effect on pesticide application. "We teach them good P.R. with the traveling public," Baker notes. "When (employees) are on the highway, they're highly visible. The public really scrutinizes what they do. By those employees having a good understanding of what they're using and the purpose that they're using it for, as far as complaints, we have had virtually none."

"It's not that we may not make some mistakes," Cassell notes. "But when we make one, if we've been doing an overall good job, it's not as likely to be overcriticized." **LM**

VIRGINIA *from page 27*

traction. We think perhaps it will be an added enticement. Hopefully, we'll be in a position that if someone's interested in looking at Virginia wildflowers in the spring or summer or fall, we can tell them which route to take for a nice ride.

"We have most of the information in from our field offices. Now Phil's going to be mapping it out."

Paying off

Roadsides now blossom with coreopsis, black-eyed Susans and bachelor's button. The program has also branched into the planting of daffodil bulbs in beds at highway welcome centers and the 39 rest areas around the state.

The program has been so successful that the garden club has won The National Landscape award for roadside beautification six years running.

"Each time they win that, they're awarded $1,000 in prize money," Baker notes. "Then what they do is donate that money to us and we purchase bulbs. With that $1,000 we can purchase about 3,000 daffodil bulbs."

In addition, Baker says, garden club members statewide donate bulbs from their own back yards. "This past year there were something like 20,000 or 30,000 bulbs (donated) in our various districts. What we do is take those and put them in dead areas on the roadside and also we will include them in the rest areas."

Baker estimates that between bought and donated, close to 100,000 bulbs have been planted under the beautification program.

Philip Baker (left) and Boyd Cassell discuss ongoing improvements at one of Virginia's 39 highway rest areas.

Besides wildflower plantings, the state has been taking other measures to keep the the state's 53,000 miles of roadsides looking good, and just as importantly, the public happy. **LM**

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COOL-SEASON TURF DISEASES

by Dr. Joe Vargas, Michigan State University

A good deal of research in the area of turfgrass diseases has turned to biological management. Biological management of necrotic ring spot, summer patch and typhula blight has been demonstrated.

Another area of interest has been the re-occurrance of resistance to fungicides by turfgrass pathogens, this time involving the pythium blight pathogen *Pythium aphanidermatum* and the anthracnose fungus *Colletotrichum graminicola*. These subjects and many more concerning the current status of turfgrass diseases are discussed in this article.

These diseases, the organisms that cause them, and their cultural, biological and chemical management tools are given in Table 1.

New strains of pythium are more aggressive than older, wild type strains.

Biological management

Necrotic ring spot. It now appears that necrotic ring spot, caused by *Leptosphaeria korrae*, is the primary patch disease found on Kentucky bluegrass in the cooler regions of the cool-season turfgrass area. The symptoms can be observed throughout the growing season even though *L. korrae* appears to be most active during the cooler weather of the spring and fall.

The plants that were infected by *L. korrae* in the cooler weather are in a weakened condition and are very susceptible to summer heat stress or drought stress. Subjecting the necrotic ring spot plants to either of these stresses will lead to the death of the weakened plants and the recurrence of symptoms, even though the pathogen may not be active at this time. The symptoms during cool weather are patches six inches to two feet in diameter with straw- to red-colored blades intermingled in the patch.

Older patches may have green grass in their centers with the straw- to red-colored blades in the outer area of the patches. When the disease symptoms occur during the warm weather the red blades are often scarce and usually only straw-colored or wilted leaves are present.

Nitrogen is important for recovery of the patches caused by necrotic ring spot. Three to five pounds of actual nitrogen per 1,000 sq. ft. per season is necessary to promote recovery and to prevent new patches from developing.

Proper cultural practices are also important in patch recovery and in the prevention of new patches. These include coring to relieve compaction and layers that result when sod of one soil type is laid on top of soil of another type, which is common practice during the establishment of home lawns and commercial lawn properties. This results in short rooting during the warm weather (when the roots of the turfgrass plant are confined to the upper layer).

Coring and re-incorporating the soil back into the thatch will, over a period of years, alleviate the layering problem. It may also help manage any potential thatch problem, which is important in managing necrotic ring spot.

Thatch has a poor moisture-holding capacity and turfs growing in a thick thatch are more susceptible to drought stress. Light, frequent irrigation is also important in managing this disease. The theory that deep, infrequent irrigation is more beneficial to turf development is just that, a theory. Preliminary research data indicates that light, frequent waterings may be more beneficial to the turf. Such wa-

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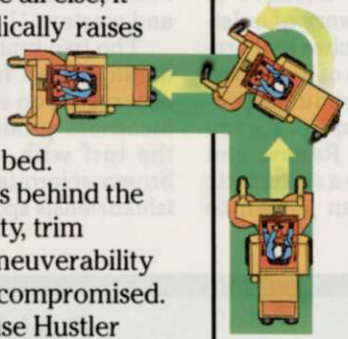

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terings on a daily basis, around midday, have been shown to help manage necrotic ring spot.

The turf appears to be benefitting culturally from the cooling of the turf and biologically from the build-up of beneficial micro-organisms in the moist thatch that may be antagonistic to *L. korrae*. There are also some new products that help manage the disease biologically.

Lawn Restore, produced by the Ringer Corporation, is a natural organic product that is a complete fertilizer containing all the major nutrients as well as some benefical microorganisms that produce substances under laboratory conditions that are antagonistic to the pathogen *L. korrae*. It has also been shown to manage necrotic ring spot under field conditions. Lawn Restore has been effective in both promoting the recovery of existing necrotic ring spot patches and preventing the development of new ones.

Another group of products produced by the Agro-Chem Co. (Green Magic, Strengthen and Renew and Nutra Aid), when used in a systematic program, also have been shown to manage necrotic ring spot under field conditions. They appear to improve the environment and allow an increase in the natural population of beneficial organisms in the soil and thatch.

The key word is "management." These products are not a one-shot cure, but used systematically on a regular basis, they will manage the disease and provide a healthy turf.

Typhula blight. Typhula blight is caused by two species, *Typhula incarnata* and *T. ishikariensis*. *T. incarnata* is the primary species in the eastern U.S. and in southern and mid-regions of the Midwest and western United States. *T. ishikariensis* is most prevalent in the more northern snow mold regions, especially where prolonged periods of permanent snow (two or more months) exist in the midwestern and western U.S.

The two typhula species are easily distinguished from each other when observed soon after the snow melts. *T. incarnata* produces grayish spots in the turf with scattered, fairly large brown sclerotia evident, whereas *T. ishikariensis* spots have a reddish cast to them and contain numerous small, dark black sclerotia.

Typhula blight only occurs under snow cover. It does not occur in the cool, wet weather of fall and spring, except under leaf piles. Typhula blight has been, and still is, managed primarly by fungicides (Table 1).

Lee Burpee at the University of Guelph has isolates of a saprophytic typhula species, *Typhula phacorrhiza* that will biologically manage typhula blight caused by *T. ishikariensis*. This biological management of typhula blight was shown to be effective under field conditions in Ontario. Research is currently being conducted to find a way to make this biological management tool commerically available.

New fungicide resistance

Pythium blight. Metalaxyl resistance to pythium blight caused by *Pythium aphanidermatum* was reported back in 1983 by Dr. P. L. Sanders at Pennsylvania State University on a single golf course in Pennsylvania. This past season, she found resistance to matalaxyl

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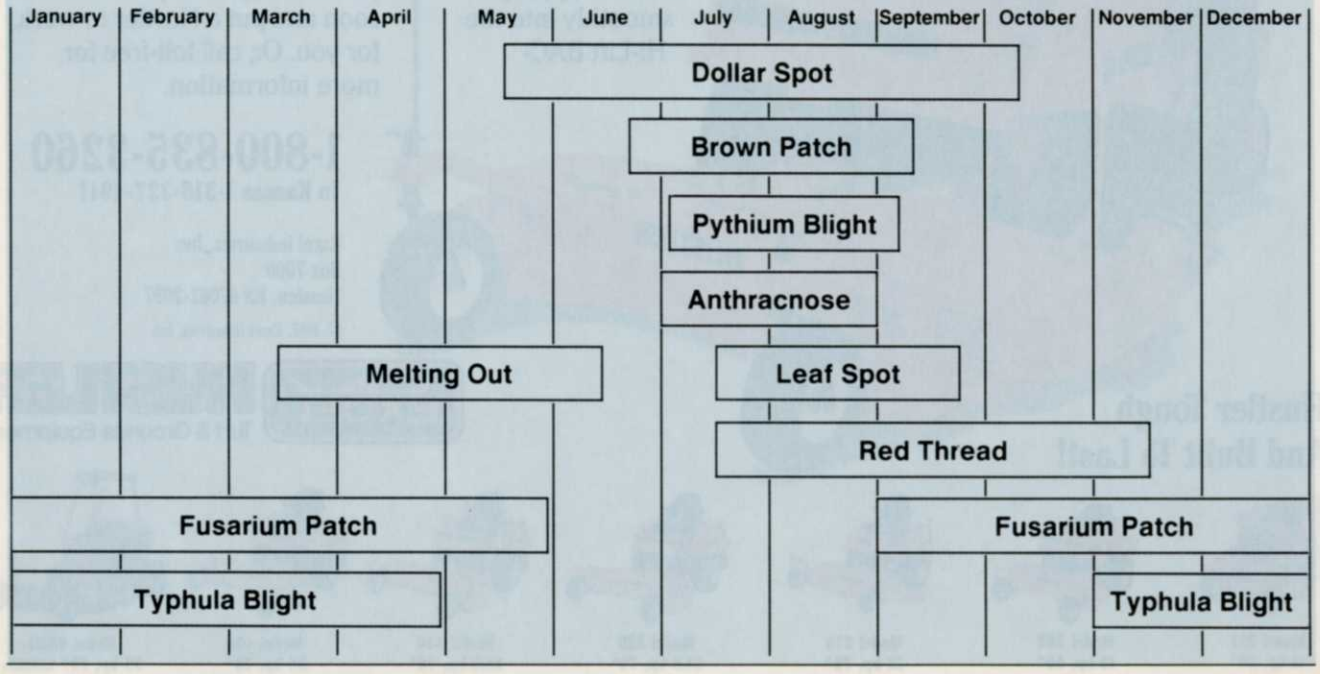

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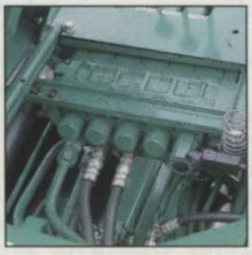

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in several additional locations in other states. We also found metalaxyl resistant strains of *P. aphanidermatum* at two locations in Kentucky on perennial ryegrass fairways.

We concurred with Dr. Sanders' previous findings that these new strains are far more aggressive than the older, wild type strains. They also appear to be pathogenic over a wider range of temperatures, occuring when temperatures were only in the high 70s.

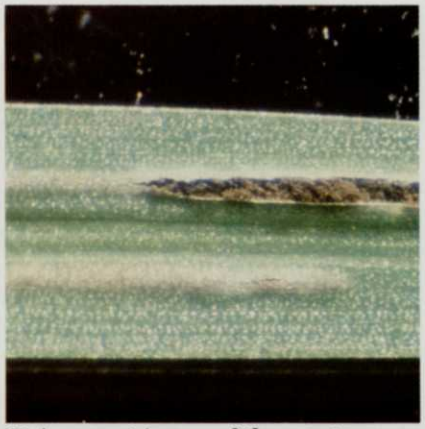
The metalaxyl-resistant strain of *P. aphanidermatum* was not cross-resistant to chloroneb, ethazole, probamocarp or fosetyl A1. These fungicides can be used where these resistant metalaxyl strains occur. How widespread or how persistent these strains will become only time will tell, but a good rule of thumb is that if these strains are going to occur, they will begin to show up the second or third year, especially if multiple applications of metalaxyl are made during the first two seasons.

The fact that the perennial ryegrasses are super susceptible to pythium blight combined with the development of the highly aggressive metalaxyl resistant strains of *P. aphanidermatum*, raises serious questions about the use of the perennial ryegrasses in areas of the country where there is a high incidence of pythium blight.

Anthracnose. Resistance to the benzimidazole fungicides (benomyl, thiophanate, thiophanate-methyl) by *Colletotrichum graminicola*, the cause of anthracnose, took much longer to develop than with other fungi like *Erysiphi graminis* (powdery mildew) or *Sclerotinia homeoecarpa* (dollar spot).

Resistance to the benzimidazoles by *E. graminis* and *S. homeoecarpa* usually occurred in the first three years and often in the second year. On the golf courses from which the benzimidazole-resistant strain of *C. graminicola* was isolated, the superintendent had used benzimidazole fungicide for 14 years. Resistant dollar spot had been observed on the course for over 12 years.

The question is, why did resistance to the dollar spot organism show up so quickly, whereas resistance to anthracnose took so long? I think the answer lies in the type of pathogen these two fungi are.



Stripe smut is one of the most devastating diseases of turf.

Sclerotinia homoeocarpa germinates and may grow for a short period of time and then infects the plant.

If fungicides like the benzimidazoles eliminate sensitive strains from the population, *S. homoeocarpa* is not capable of growing saprophytically after the fungicide has disappeared from the environment in order to re-establish itself throughout the turf area. This allows resistant strains, which are in low numbers in the population, to infect the turf and begin to build up their numbers quickly in the absence of competition from the benzimidazole-sensitive wild type strains. Under such conditions, the benzimidazole-resistant strains can build up rapidly in the turf.

Colletotrichum graminicola, on the other hand, spends much of its life living as a saprophyte in the thatch and mat on dead organic matter when it is not a pathogen. So, when fungicides like the benzimidazoles eliminate sensitive strains from the population, the survivors can grow saprophytically and build up the population again.

With this type of competition, it would take benzimidazole-resistant strains many years to build up large enough numbers to become the dominant strain in the population. The message is that those of you who have been using the benzimidazoles for many years should be on the lookout for the emergence of benzimidazole-resistant strains of *Colletotrichum graminicola*. Don't be lulled into thinking that if resistance hasn't occurred by now, it won't occur.

Managing stripe spot

This disease, caused by *Ustilago striiformis*, is one of the most devastating diseases of turf. The patch diseases have certainly received all the notoriety in home lawn turf problems but more turf has been lost to stripe smut.

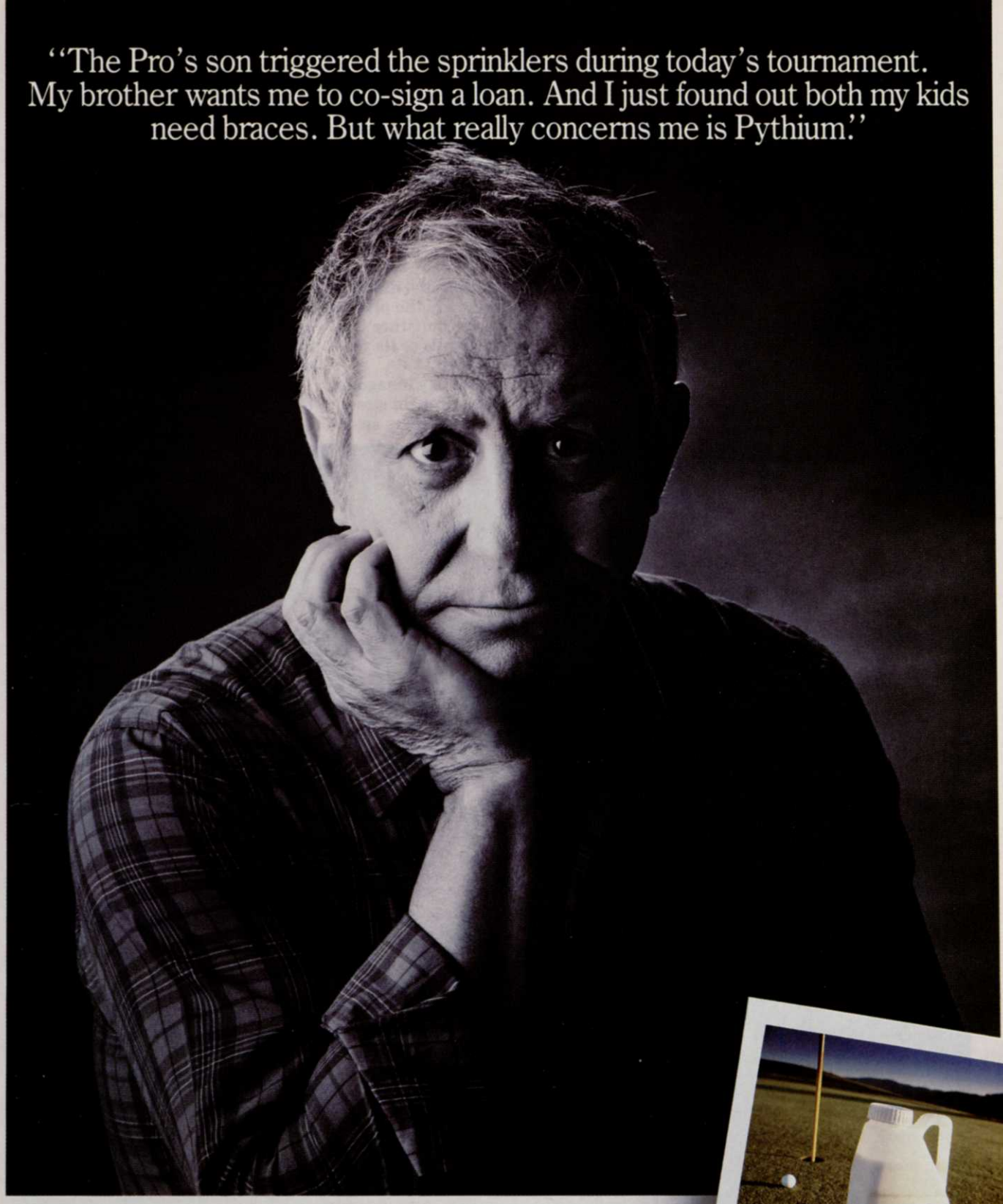
The reason stripe smut doesn't recieve all the notoriety is that, in most instances, it is a slower-acting disease that weakens infected plants which are then crowded out by weeds or die under stress randomly as individual plants rather than as large areas dying all at once. The remaining stripe smut infected plants are too weak to fill in the voids and this allows weeds to enter in the turf. If the weeds are broadleaf or annual grasses, like crabgrass, then selective herbicides can be used to remove them.

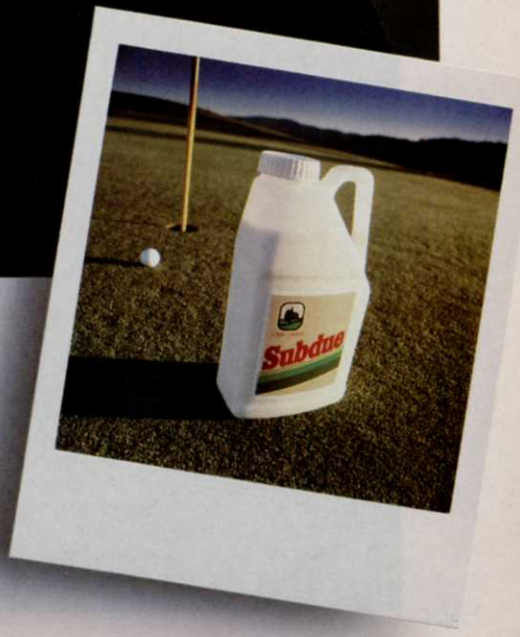
However, unlike healthy Kentucky bluegrass, the weakened stripe smut-infected plants cannot fill in the voids where the weeds were selectively removed and eventually the perennial weedy grasses like tall fescue and quackgrass fill in these voids. A total renovation of the existing turf is the only solution to a lawn infested with perennial weedy grasses since there are no selective herbicides.

What makes stripe smut such a devastating disease is that it is a systemic perennial disease. This means that once a plant is infected it will remain so for life. Any daughter plants arising from an infected mother plant via rhizomes or stolons will also be infected. So, unlike most other diseases, infection does not have to take place every year. All that's needed is environmental stress for this stripe smut weakened plant to die.

The foliar symptoms are most evident during the cool weather of spring and fall when the fungus grows

"The Pro's son triggered the sprinklers during today's tournament. My brother wants me to co-sign a loan. And I just found out both my kids need braces. But what really concerns me is Pythium."





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throughout the veins of the plant, eventually producing spores which rupture the epidermis, causing the leaves to have a frail, torn appearance.

Though the symptoms are most evident in the cool weather of the spring and fall, most of the turf infected with stripe smut dies in the summer when the turf is allowed to go under drought stress. This may be due to the plant's inability to conserve moisture because of its torn epidermis or its general weakened condition.

When healthy Kentucky bluegrass is allowed to go under drought stress, it will go dormant and green up again with the occurance of late summer or early fall rains. Kentucky bluegrass turf infected with stripe smut, however, will die if allowed to undergo drought stress.

The fact that the disease is systemic suggests that there is little resistance in the plant. Resistance is

COOL-SEASON TURF DISEASES
TABLE 1
TURF DISEASE AND CONTROLS

Disease	Causal Agent	Hosts	Biologial and Cultural Control	Chemical Control
Anthracnose	*Colletotrichum graminicola*	Annual bluegrass Fine-leaf fescue Kentucky bluegrass Perennial ryegrass	Adequate nitrogen. Cool grass by syringing.	Maneb plus zinc sulfate, chlorothalonil, benomyl, thiophanate-methyl, thiophanate, thiophanate-methyl + mancozeb, triadimefon
Brown patch	*Rhizoctonia solani*	All major turfgrass species	Reduce nitrogen. Remove "dew." Increase air movement.	Mancozeb, maneb + zinc sulfate, chlorothalonil, anilazine, vinclozolon, benomyl, thiophanate-methyl, thiophanate, thiram, thiophanate-methyl + maneb, cadmium compounds, thiophanate + thiram, PCNB, iprodione
Dollar spot	*Lanzia spp.* *Moellerodiscus spp.*	Annual bluegrass Bahiagrass Bermudagrass Centipedegrass Colonial bentgrass Fine-leaf fescues Kentucky bluegrass Perennial ryegrass St. Augustinegrass Zoysiagrass	Increase nitrogen. Remove "dew."	Benomyl, thiophanate, thiophanate-methyl, chlorothalonil, anilazine, fenarimol, cadmium compounds, thiophanate + thiram, thiram, thiabendazole, benomyl, iprodione, thiophanate-methyl + maneb, vinclozolin, triadimefon
Summer patch	*Phialophora graminicola*	Annual bluegrass Kentucky bluegrass	Light, daily watering during the summer.	Fenarimol, thiophanate-methyl, thiophanate, triadimefon, iprodione, benomyl
Helminthosporium Diseases Brown blight Leaf blotch Melting-out Net blotch Read leaf spot Stem and crown necrosis Zonate Eye spot Leaf spot	(Dreschlera) *D. siccans* *D. cynodontis* *D. poae* *D. dictyoides* *D. erythrospila* *D. specifera* *D. gigantea* *Bipolaris sorokiniana*	 Ryegrass Bermudagrass Kentucky bluegrass Fescue Creeping bentgrass Bermudagrass Bermudagrass Bentgrass Fine-leaf fescue, Kentucky bluegrass	 Remove clippings. Raise cutting height. Plant resistant cultivars. Moderate spring nitrogen. Daily irrigation.	 Mancozeb, chlorothalonil, iprodione, anilazine, maneb + zinc sulfate, PCNB, vinclozolin

continued on page 40

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expressed as keeping the infection localized, that is, small spots on the leaves, as in the case of the rust diseases. Leaf rust and stem rust are considered minor diseases of turf because they tend to produce localized lesions whereas stripe rust is a major disease because it is systemic in the plant, indicating little resistance.

Until recently, a stripe smut-infected turf was subject to a slow but inevitable death, eventually being taken over by perennial weeds, which meant the turf had to be killed by a herbicide like Roundup and completely renovated. However, the development of triadimefon and fenarimol has changed all that. These two fungicides, used on a regular basis, will manage stripe smut.

The first application should occur in the spring just before the turf breaks dormancy, followed by a second application just prior to the summer heat stress period and a third application when the cool nighttime temperatures of the late summer or early fall return.

Other patch diseases

Summer patch. It has become increas-

continued on page 44

COOL-SEASON TURF DISEASES
TABLE 1
TURF DISEASE AND CONTROLS

Disease	Causal Agent	Hosts	Biologial and Cultural Control	Chemical Control
Take-all patch	*Gaeumannomyces graminis*	Creeping bentgrass Kentucky bluegrass Velvet bentgrass	Reduce soil pH. Avoid liming, Use acidic fertilizers. Sulfur	Fenarimol
Pythium blight (cottony blight)	*Pythium spp.*	Perennial ryegrass Creeping bentgrass Annual bentgrass	Improve soil drainage. Increase air circulation.	Chloroneb, ethazol, metalaxyl, propamocarb
Red thread	*Laetisaria fuciformis*	Creeping bentgrass Colonial bentgrass Bermudagrass Annual bluegrass Perennial ryegrass Fine-leaf fescue	Increase nitrogen.	Anilazine, iprodione, triadiefon, vinclozolin, chlorothalonil
Pink patch	*Limonomyces roseipellis*	Perennial ryegrass Creeping bentgrass Fine leaf fescue	Increase nitrogen.	Try red thread fungicides
Snow molds Typhula blight Fusarium patch	*Typhyla spp.* *Fusarium nivale*	Annual bluegrass Colonial bentgrass Creeping bentgrass Fine-leaf fescues Kentucky bluegrass Perennial ryegrass Tall fescue Velvet bentgrass	Avoid early fall nitrogen fertility that leads to lush growth.	Mercury compounds, PCNB products, chlorothalonil, chloroneb. These products may have to be used in combination for effective snow mold management. Benomyl, iprodione, or mancozeb will control Fusarium patch where it occurs alone.
Necrotic ring spot	*Leptosphaeria korrae*	Kentucky bluegrass	Nitrogen to promote recovery. Light daily irrigation. Lawn Restore, Green Magic, Strengthen & Renew.	Iproione, fenarimol, benomyl, thiophanate, thiophanate-methyl
Stripe smut	*Ustilago striiformis*	Kentucky bluegrass Creeping bentgrass	Reduce nitrogen. Prevent summer dormancy.	Fenarimol, triadimefon

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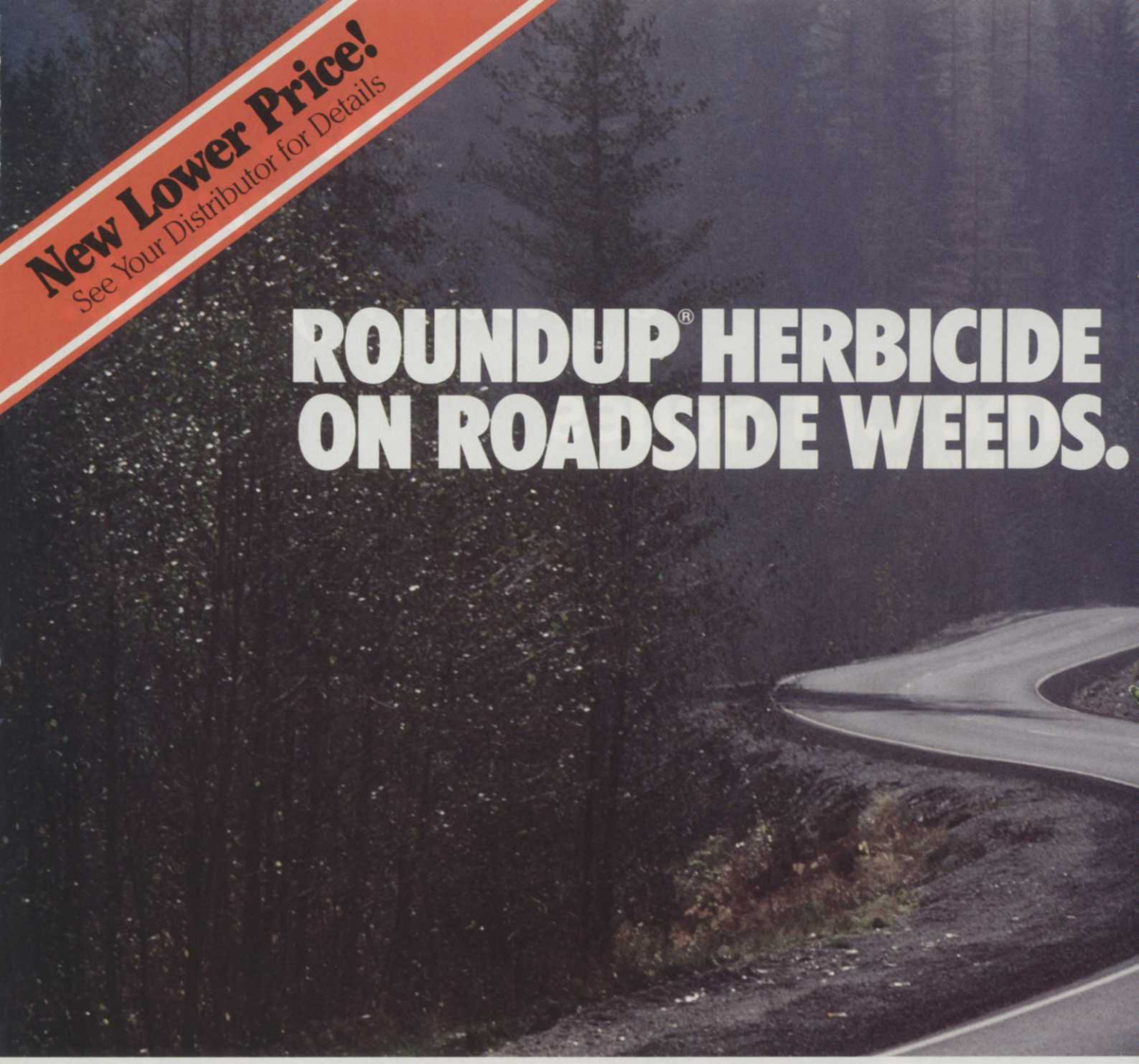

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DISEASE *from page 40*

ingly evident over the past few years that summer patch, caused by *Phialophora graminicola*, is a primary disease of annual bluegrass during warm weather. It can also be found on Kentucky bluegrass and fine-leaf fescues, especially in the warmer areas of the cool-season grass region.

On annual bluegrass, the initial symptoms are a yellowing of the turf in patches, usually six inches to one foot in diameter, followed by a thinning of the turf, with the remaining turf turning bronze in color. If warm weather persists, all the turf in the patches may die.

Most of the creeping bentgrass cultivars are resistant and creeping bentgrass frequently can be seen recolonizing the centers of these patches. Preliminary data indicate that soil temperature and soil moisture may be important in the development of this disease.

Both excessive and limiting soil moisture during periods of hot weather may result in severe outbreaks of summer patch. Lighter and more frequent irrigations should help reduce the severity of summer patch.

Take-all patch. Take-all patch, caused by *Gaeumannomyces graminis var. avenae* was formerly known as ophiobolus patch caused by *O. graminis*. This disease was originally thought to be confined to the Pacific Northwest. It has now been reported throughout the United States and Canada wherever creeping bentgrass is grown.

Effective chemicals

Fungicides for the management of the patch diseases and how to use them are discussed below:

Benomyl, thiophanate and thiophanate-methyl. These fungicides will manage all three diseases. They are all basically the same chemistry as far as mode of action is concerned. They are also systemically translocated upward and outward from where they enter the plant. For fungicides to be effective against these root pathogens, they need to be drenched into the soil where they can be taken up by the roots. If they are allowed to dry on the foliage, they will not manage the patch diseases.

For best results the area to be treated should be irrigated just prior to treatment.

Fenarimol. This fungicide will also manage all three patch diseases and does not need to be drenched in to be effective. For management of summer patch on annual bluegrass, treatments should be applied early in the season before the temperatures go into the 80 degrees Fahrenheit range on a permanent basis.

Iprodione. This fungicide is effective against necrotic ring spot and does not need to be drenched in to be effective.

Triadimefon. This fungicide is effective against summer patch and does not need to be drenched in to be effective. There are some reports in the literature that suggest this product is only effective against summer patch when applied as a preventive treatment. **LM**

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WARM-SEASON TURF DISEASES

by Dr. Don Blasingame, Mississippi State University

Managers of southern turf not only fight diseases of six different warm-season turf species, but also diseases of overseeded cool-season turf species.

Although most southern turf diseases are caused by fungi, agents such as bacteria, viruses and nematodes can cause serious problems to certain grasses.

Southern turf managers can't depend solely on fungicides for disease control. Good variety selection, proper fertilization and appropriate cultural practices are very important in disease control.

No amount of fungicide will compensate for poor fertility and cultural practices. Knowing when the most common diseases occur also will aid managers in scheduling fungicide applications (see chart).

Brown patch

Brown patch is the most common turf disease in the Southeast. Although St. Augustine and zoysiagrass are the most susceptible species, even the more tolerant centipedegrass, Bermudagrass and ryegrass are frequently damaged by this fungus.

Brown patch is favored by warm, moist weather combined with cool nighttime temperatures. Therefore, in certain areas of the South, brown patch can and does occur any month of the year.

In the upper regions of the South, the most favorable conditions for brown patch development occur from late April through mid-October.

Symptoms of brown patch on warm-season grasses are different than the symptoms of the disease on cool-season turf. Even though the grass is usually killed in a circular pattern, many times the smoke ring is not seen on southern turf.

Under certain conditions the fungus may cause a gradual thinning of the turf over a rather large area instead of killing in a circular pattern.

Several factors tend to make the grass more suceptible to brown patch. One is the excessive application of nitrogen fertilizer. The resulting lush growth is readily attacked.

Another is watering late in the afternoon and allowing the grass to remain wet for long periods of time. Excessive accumulation of thatch also creates a favorable environment for the development of brown patch and many other diseases.

Fungicides are best used on a preventive schedule. Once symptoms develop, control can be difficult.

Spring dead spot is a serious disease of Bermudagrass in the upper sunbelt.

Dollar spot

Dollar spot is common on Bermudagrass, zoysiagrass and annual and perennial bluegrasses.

Symptoms of dollar spot are different on certain warm-season grasses than those noted on cool-season grasses.

On finer textured grasses, such as Bermudagrass and zoysiagrass, the disease kills grass in small patches two to three inches in diameter. Under severe conditions, these patches may coalesce so that the turf has a mottled appearance. Blades of grass at the outer edges of the infected area develop tan spots with reddish brown margins.

On coarser warm-season grasses, turf is killed in larger patches ranging up to a foot in diameter.

Dollar spot is prevalent during periods of mild weather in the spring and fall.

Unlike brown patch, dollar spot is retarded by high levels of nitrogen. Still, turf managers should consider the impact of high nitrogen on brown patch and other diseases.

continued on page 48

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WARM SEASON *from page 46*

Watering should be performed only in the early morning so the foliage can dry quickly. Fungicides can be used to help bring the disease under control once it gets established.

Leaf spots

A number of fungi cause leaf spots on many southern grasses. Regardless of the causal agent, leaf spots and their control on southern grasses are similar.

Melting out (*Bipolaris* spp.)—Bermudagrass and ryegrass are most severely affected by these infections, although the fungus can survive on centipedegrass and St. Augustine.

Infection can occur over a wide range of temperature, but usually is more severe at 70 to 95 degrees Fahrenheit. Milder temperatures in the spring and fall are more favorable for infection.

Melting out causes small, dark-colored spots or flecks on the leaves and sheaths. Leaf spots are usually more numerous near the collar of the leaf blades. Severely affected leaves wither and die and the turf frequently becomes brown and thin.

Symptoms on overseeded ryegrass are altogether different. Although leaf spots may occur, this same melting out can cause severe crown rot. This causes a yellowing and discoloration of the grass and a general thinning of the turf.

Fertilize with adequate levels of nitrogen and potassium if melting out diseases become a problem. With careful management, apply fungicides recommended for melting out blight control.

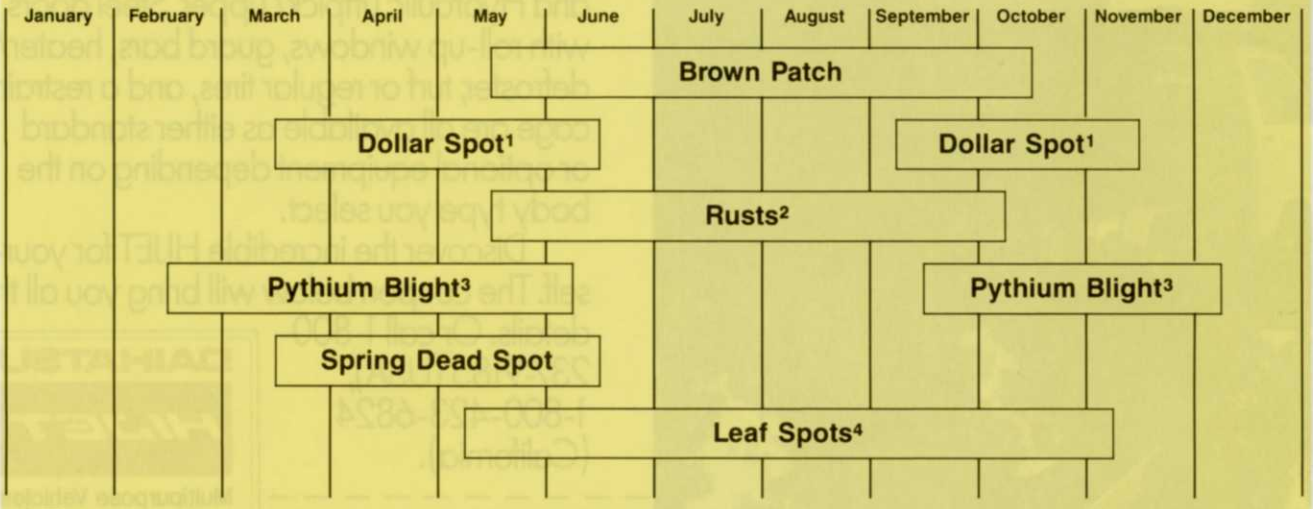
Gray leaf spots—St. Augustinegrass is the primary host for gray leaf spot. The disease occurs throughout the lower South during warm, humid weather.

Spots on the leaf blades are the most visible, but sheath and stem lesions also occur. Leaf spots begin as olive green to brown, water-soaked spots as small as a pinhead. These enlarge rapidly and form a circular to elongated lesion that is brown to ash colored with purple margins.

The disease occurs during moderate to warm weather accompanied by high relative humidity. Severity of the disease is enhanced by applica-

CALENDAR

Major Diseases of Warm-Season Turf*



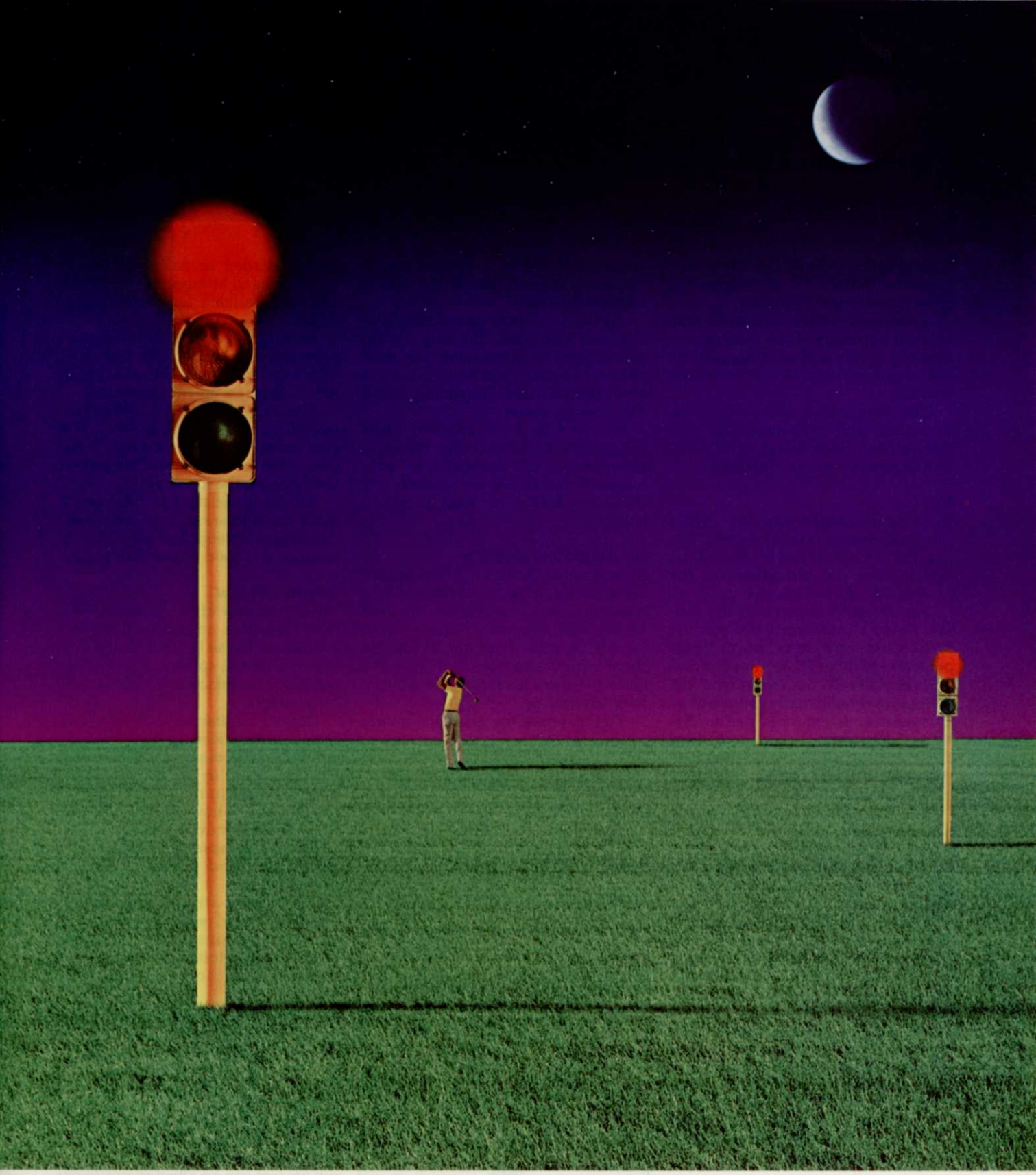
*** The calendar gives the normal time for turf diseases to occur. However, they may occur at other times depending upon environmental conditions.**

1 - Dollar spot affects overseeded turf as well as warm-season grasses.

2 - Rust does affect overseeded grasses but is most common on zoysiagrass.

3 - Pythium blight is most damaging on overseeded turf but can cause damage to warm-season turf especially during "transition" periods.

4 - Most warm-season grasses are affected by certain leaf spots. For example: gray leaf spot of St. Augustine and the helminthosporium complex on Bermudagrass.



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tions of nitrogen fertilizer. It is more a problem in shaded areas where the grass remains wet from dew.

Treatment with a fungicide may become necessary if the disease outbreak is severe and accompanied by prolonged periods of wet favorable weather.

The fungicides chlorothalonil, mancozeb and cycloheximide plus thiram have been found to be effective in controlling gray leaf spot.

Rust

Rust or *Puccinia* species infect ryegrass, zoysiagrass, bluegrass, fescue, Bermudagrass and St. Augustine. Zoysiagrass and bluegrass are the most often infected grasses.

Susceptibility depends on the variety. Fungus infection is favored by minimum and maximum temperatures of 50 to 70 degrees Fahrenheit respectively. For this reason, the disease does not usually cause severe damage over an extended period. It is likely to be more severe in shaded areas during rainy, humid weather. Affected turf will appear unthrifty and begin to thin.

The disease is characterized by the presence of pustules on the leaf blades. These pustules range from bright orange to cinnamon-brown in color depending upon the species of fungus present.

Certain varieties of ryegrass are extremely susceptible to rust, and sometimes severe damage can occur. Zoysiagrass, especially Meyer and Emerald, are most severly infected by rust.

Fertilize to stimulate grass growth, mow on a four- to five- day schedule and catch clippings. If necessary, a fungicide may be applied to help reduce the amount of disease present.

Triadimefon, chlorothalonil, mancozeb and cychloheximide are effective in controlling rust.

Spring dead spot

Spring dead spot is a serious disease of Bermudagrass in certain parts of the upper sunbelt. It is found generally on Bermudagrass or zoysiagrass under high maintenance.

Damage to the turf apparently occurs during the dormant season. When greenup occurs in the spring, areas a few inches to several feet in diameter appear where the sod is completely dead.

Spring dead spots' causal agent has not been identified. The only control procedures recommended are good cultural practices and limiting the use of nitrogen fertilizer, especially late in the growing season.

Research has shown that fungicides can limit the damage. However, at the present time only benomyl and PCNB are labeled, and these may be limited uses in certain states.

St. Augustine decline

St. Augustine decline (SAD) is caused by a virus. The symptoms are a mosaic-type chlorosis of the leaf blades that resemble nutrient deficiency or mite feeding. Evidently there are several strains of the virus since there is a great range in damage to St. Augustine.

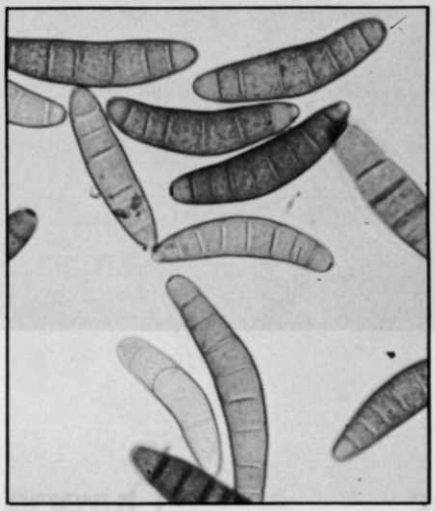
To this point, the disease has only been recorded in Arkansas, Texas, Louisiana and Mississippi. No chemicals are available for the control of SAD.

Several varieties of St. Augustine, however, are resistant to the virus. These can be planted in areas where the disease is a potential problem.

Floratam was the first variety released with resistance to SAD. It is also resistant to chinch bugs. It has poor cold tolerance and should be used only in the lower South.

Seville is resistant to SAD and is more shade tolerant than common St. Augustine. Raleigh has both SAD resistance and good winter hardiness.

Turf managers should consider the impact of high nitrogen on brown patch and other diseases.



Spores of the melting out fungus can easily be spread by wind, rain and equipment.

Downy mildew

Downy mildew of St. Augustine was first described on common St. Augustine in Texas in 1969. Since then the disease has spread and has been identified in Arkansas, Louisiana and Mississippi.

Downy mildew appears as white, raised, linear streaks that develop parallel to the mid-veins of the leaf. Streaks appear in the spring and remain throughout the summer, giving the leaves a yellow appearance with some death toward the tips.

Severe disease occurs in grass grown in flood plains or poorly drained areas.

The white-streak symptom is easily confused with the virus disease, St. Augustine decline. However, the virus symptoms are more yellow in color and more mottled than striped.

Downy mildew has been difficult to control with most common turf fungicides. Good drainage is recommended for cultural control.

Pythium blight

Pythium blight can be a devastating disease on overseeded ryegrasses. Bermudagrass and other warm-season grasses can be affected to a lesser degree.

An abundance of moisture is required for pythium blight development. In addition, the disease is favored by warm temperatures.

Affected grass is killed rapidly in spots two to four inches in diameter. These spots may develop into streaks so that large areas of turf are damaged.

continued on page 52

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WARM SEASON *from page 50*

During early stages of development, the affected grass appears wilted and greasy. At times the affected turf spots may have a cottony appearance due to the abundant growth of the fungus. For this reason, the disease is frequently referred to as cottony blight.

Certain species of pythium can also cause root rot on turtgrasses. Due to the restricted root function, the plants become chlorotic and the turf begins to thin.

On overseeded grasses the disease can be limited by using treated seed and delaying the overseeding until as late as possible during the fall. Water as little as possible during periods of favorable activity. The perennial ryegrasses are not as susceptible as annual. Under severe disease pressure, chemical control may be required.

Fairy rings

Fairy rings generally appear in lawns and other turf areas as circles or arcs of dark green, fast-growing grass during the spring and early summer. A ring of thin dead grass may develop on one or both sides of this circle.

The disease is caused by one of several soil-inhabiting fungi that commonly produce mushrooms. Mushrooms that sometimes appear in the ring are the fruiting bodies of these fungi. Stimulation of the grass is due to release of nutrients from the organic breakdown of the thatch by the growing fungus.

No chemicals are labeled for the control of fairy ring.

Two general approaches may be considered: removal and suppression. Although relatively impractical, removal of infected soil and grass to a depth of 12 inches or more in a band several feet on each side of the infected area and replacement with clean soil is one solution.

Another approach is to suppress the disease. For low-maintenance grass areas, increase the water and fertilization program to stimulate the declining grass inside the ring. Symptoms of fairy ring can be masked by pumping large quantities of water into this area.

Slime molds

Slime molds are a group of organisms that cover above-ground plant parts with a dusty gray-black or dirty yellow mass.

When you look closely at this growth, you see small round balls scattered over the plant. If you rub these between your fingers, a sooty powder emerges. This consists of spores of the fungus.

Slime molds normally live in soil where they feed on decaying organic matter. When the mold is ready to reproduce, it grows up on to the grass blades so that the spores may be spread greater distances.

Slime molds do not feed on living plants. They only use them to assist in the distribution of spores during reproduction.

Slime molds occur during wet weather throughout the spring, summer and fall. They disappear rapidly as soon as it becomes dry. Chemical control is usually not necessary. **LM**

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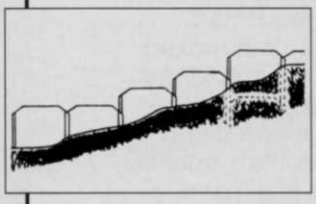

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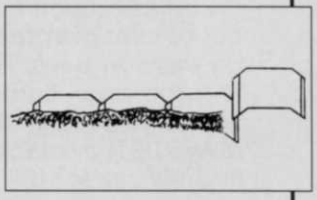
Since **EDGE LOCK™** slides together vertically, you can use it like a stair step to negotiate up or down hills easily!



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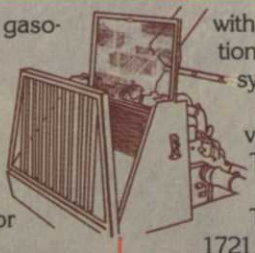

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Bob Bruglio (left) and Frank Torre claim their trucks are the most attractive in all of Michigan.

The Grainer residence, right, one of Torre & Bruglio's pieces of art.

KEEPING IT CLEAN

Torre & Bruglio Landscaping of Michigan is blessed with the sweet smell of success. No wonder: it's squeaky clean.

by Jerry Roche, editor

Frank Torre and Bob Bruglio are Italian, and proud of it. They enjoy a good meal. They like fancy trucks. They are meticulous dressers.

"We like to *touch* everything," Torre admits over lunch in a Mount Clemens, Mich. restaurant. For emphasis—to let you know he delivers the next line with some emotion—he grabs the salt and pepper shakers and squeezes. Tightly. Very tightly: "I don't think we want to lose that touch. When something gets out of reach, you can't touch it any more."

He is talking about the size of Torre & Bruglio Landscaping, a company he and Bob Bruglio began with a Massey-Ferguson truck and leased tools back in 1976.

Today, they *own* 42 trucks and $1 million worth of equipment. Today, an autographed photo of Lee Iacocca hangs on the reception room wall, testament to the job they are doing on Chrysler's 40-acre world headquarters and five divisional offices.

A class act

The key to their success? Class. Lots of it. Everything from an immaculately-landscaped headquarters to designer trucks to uniformed,

cleanly-shaven workers. They simply don't allow anything to "touch" their business that doesn't reek of professionalism.

"Everybody wears white shirts and green pants," explains Torre, the younger and more talkative of the duo. "They're on time, they shave in the morning, they have presentable haircuts. If they don't, they're home. That's very important."

When it comes to rule enforcement, Bruglio says his partner is "the hatchet-man." And you believe it.

Their fire-engine-red trucks are hand-painted (some say "Torre & Bruglio—The Dagos") and pin-striped.

Their landscapes are, likewise, picture-perfect. "When we walk away from a job, it's spotless," Torre says.

Things haven't always been as profitable for Torre & Bruglio; but they've always been exciting.

Torre remembers 1976: "There were just the two of us. The first summer, we did everything by hand. People were saying we were nuts moving dirt with wheelbarrows. But it was a challenge: can we knock out this job today?"

The memories begin to wash over Bruglio's face. "We always tried to outdo ourselves," he reminisces. "People could pick our jobs out. A lot of people couldn't figure out how we got so big so fast. But if they had followed us around, they'd know: we worked our asses off. The first five years, it was seven days a week, sun-up to sun-down."

Some say partnerships are the worst way to organize a business. But it's worked for Torre and Bruglio.

"What has kept us together is that our goal is the same," says Torre. As if to emphasize the point, Bruglio repeats it: "We stand back-to-back on everything."

That doesn't mean agreeing on everything. In the early years, when they won a new job, they would separately plan on how to implement what the client wanted. Then they would compare plans and come up with the best alternatives. It wasn't always easy. "If we both agreed on everything, then *one* of us shouldn't be here," says Bruglio now, chuckling to himself at the memories.

Diversified services

Torre & Bruglio has developed into a full-service landscaping company. It has an architectural department, construction division, maintenance divi-

At Torre & Bruglio, every employee, every piece of equipment is important.

Landscape architect Vince Rampolo (left) goes over some plans with Bob Bruglio (center) and Frank Torre.

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KEEPING IT CLEAN

sion and spray division.

Accounts are both commercial and residential, from very large to very small. They include Chrysler, Volkswagen of America, the National Bank of Detroit and Wendy's and McDonald's restaurants. Torre and Bruglio have worked in Michigan, Indiana, Ohio, Illinois and Pennsylvania.

"Our customers seem very satisfied with this service of maintaining their landscaping projects as well as designing them and providing them with worry-free service," Torre admits. The company handles everything, as Torre says, "right down to the last blade of grass."

Both owners make a point to visit key personnel often. They head out of the main building into the modified mobile home that houses the maintenance and spray divisions where Bob Zaccheo and Jim Lendini orchestrate the work of 50 employees. Then they cut across the back lot, trucks smartly aligned, up some steps of an elaborate wooden deck and into the architects' building to visit head architect Vince Rempolo and nurseryman Steve Tinsley. To talk to construction chief Larry Pretzer, they head back to the main building past a pond stocked with trout.

This is a quality home for Torre & Bruglio. "We stand for quality," Torre notes. "We try to teach our people the same thing. We all work together as a family."

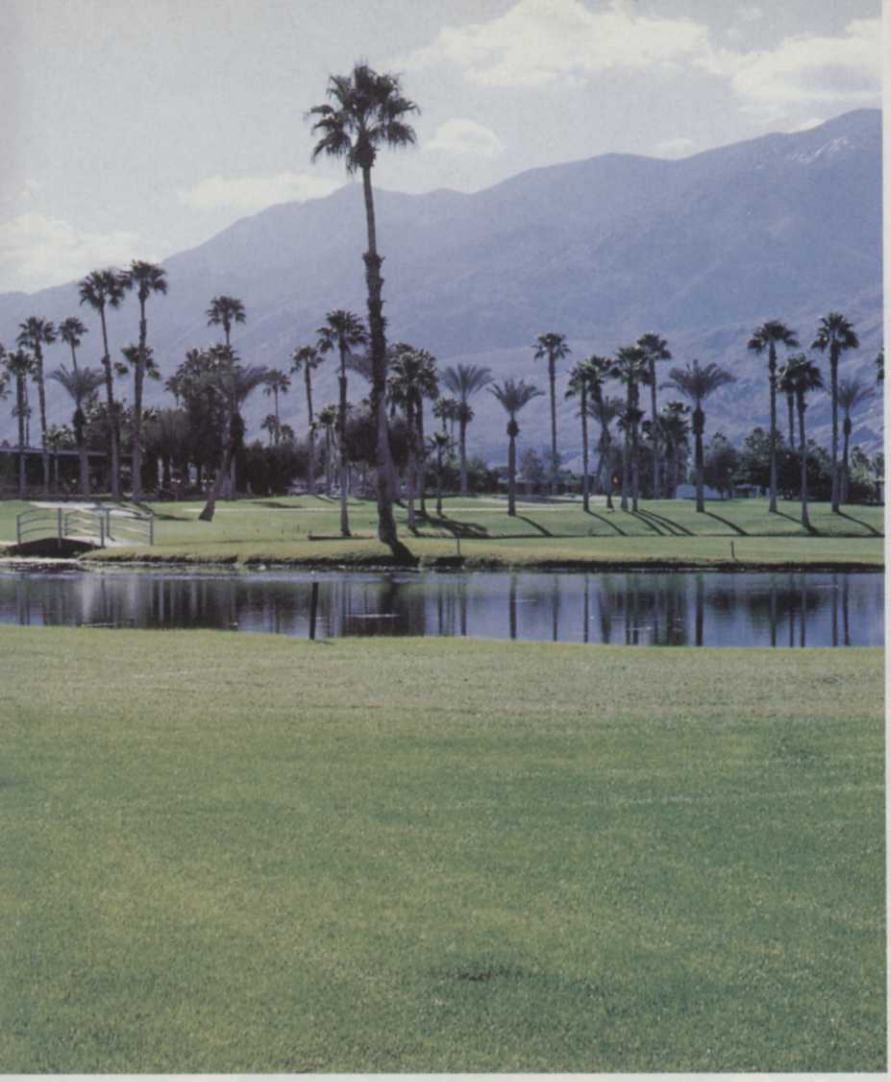
The equipment, too, is top quality. A dozen Toro Groundsmaster 72s, Toro and HMC/Green Machine edgers, Jacobsen push mowers with steel decks.

Steady as she goes

Where growth was unbridled in the past, Torre and Bruglio are now planning for steadier growth. "We're always looking ahead," Bruglio says. "But you have to realize that bigger isn't always better," Torre adds. "Once you've lost control, you've lost everything. It becomes a total zoo."

The only goal they have set for the company is eloquently stated by Bruglio:

"We'd like people to say, 'Those guys are good, they're professional and they're honest.'" **LM**



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— *Dick Ameny,* *General Manager, Canyon CC, Palm Springs, California*

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- *"On top of that, our water costs are going to be reduced by over 30%."*
- *"Also, we have been able to reduce our work staff by two people."*
- *"In the past, we had an antiquated system, which was a quick-coupler."*
- *"Toro is the only company that had a new low-pressure system."*
- *"We are going to have a much nicer golf course. Canyon CC now has a beautiful stand of grass — only five weeks old. This is the first time that it has come up this fast and made our course this playable."*
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日本紀念庭園

A TRIBUTE

RATHER THAN A MEMORIAL TO KANAYE NAGASAWA

by Heide Aungst, managing editor

On Design

1.

2.

3.

4.

Kanaye Nagasawa is a name which few will recognize. Fewer still would recognize his birth-given name: Hikosuke Isonaga. Nagasawa (the name he took when he left feudalistic Japan in 1865) earned a place in Japanese history as a pioneer in the Western world. He is remembered in U.S. history as the "Grape King" of California, a master wine maker.

More people will learn of Nagasawa's place in history when they visit the gardens at Fountaingrove Country Club in Santa Rosa, Calif. Mack and Mark Tabata of Tabata Landscaping Co., Santa Rosa, designed and installed the gardens, "as a tribute to the man, not a memorial."

The entry garden represents Japanese landscape design principles: an idealistic view of nature, not a miniaturized copy of nature. Japanese pine and Japanese cherry trees help achieve this purpose (#3). Developing the site wasn't easy *(before,* #1).

The entire property, including golf course, is 120 acres, but the Tabatas worked on about seven in Phase I of the project. Trenches could not be backfilled with the rocky native soil, so the company imported 4,400 cubic yards of topsoil, sand and pea gravel to backfill and establish the finish grade.

The concept of water as an essential element of life prevails throughout the site. Water can be seen or heard at any spot on the property. The firm used dry creeks purposely to stimulate visitors' imaginations. They meticulously placed more than 3500 tons of rock to create this effect (#4). Extensive use of drought tolerant species, the dry creeks and five miles of drip irrigation minimizes water demand. Other plant material on the site ranges from low-maintenance species to high maintenance color, such as yellow and gold marigolds in focal point areas (#2)

Phase I of the project, completed in August 1986, cost $490,000. It won the California Landscape Contractors awards for outstanding achievement in design/build and first place for large commercial/industrial sites.

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Both mowers have an adjustable mowing height of 1.5 to 5 inches that you set without needing any tools except your hands.

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Both boom systems have a handy modular design that can be arranged in various configurations, so you won't be.

Of course, one of the best parts about the Yamaha Terrapro™ PTO isn't just what's in back. It's what's up front. Like a 349cc, 4-stroke engine that lets you tackle mountains of work. Not to mention mountains.

Or what's below. Like the high-flotation tires that let you go out into the mud. And come back.

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Circle No. 151 on Reader Inquiry Card

RESEARCH UPDATE

Learning better sod production from Europe

by Dr. Martin Petrovic, Cornell University

Sod and seed fields represent the backbone of the turfgrass industry's production aspects. Sod demand is so tied to the construction industry that periodic shortages occur, as now in parts of the country.

Several factors have resulted in the recent need for accelerated sod production technology. These are:

1. Shortage of supply brought on by the "construction boom."

2. Increased cost of land and taxes, resulting in higher production cost per acre.

3. Suburbanization pressures on developing land rountinely used for sod production.

Accelerating production of sod would mean either more total product could be produced by a given sod grower on the same number of acres (important during a time of shortage) or the same amount of product grown on considerably less land (can spread the per acre cost over more product). Also, if sod could be produced faster, the sod grower might be more willing to grow a wider range of specialized crops of different turfgrass species and/or cultivars.

Normal production time for a cool-season sod is about nine to 18 months. Reducing the production time to less than nine months has seldom been accomplished without the use of netting. Sod production with netting has been cut to about eight weeks. But that method has not been widely used because of its high cost and its difficulty to install before seeding.

Another way to accelerate production could be to use a root impermeable layer system (RILS) which would restrict root growth above the layer.

In this case, sod strength could be developed by the massive root system produced in place of the traditional site of soil strength, namely the secondary stems of the rhizome and/or stolon. This approach has been used commercially in Western Europe by growing sod on a 3/4-inch layer of compacted pine bark mulch on black plastic (Fig. 1).

One sod grower in Ohio proposed the technique more than 10 years ago for a cool-season sod. Research has shown that it is possible to produce a warm-season grass sod in less than 65 days on a four-inch thick organic layer or plastic.

An advantage of using RILS for sod production is that any reasonably level land close to an urban center could be used for production. In addition, urban and suburban centers must dispose of organic wastes, like sewage and sludge and leaves. If used in this sod production system, it could provide an attractive economic and environmental alternative to landfills, incineration or land application.

Figure 1: The sod develops an extensive root system.

With this in mind, studies were initiated in 1986 by Cornell University to examine the feasibility of the RILS for cool-season sod production. The objectives of these studies were to:

Reducing sod production time to less than nine months has seldom been accomplished without the use of netting.

- determine how long it would take to produce Kentucky blue or bluegrass-ryegrass mixture sod by RILS vs conventional sod production techniques;
- determine if the season of the year had an effect on the time required to get a harvestable sod by RILS; and
- determine if the physical and chemical properties of the organic medium have an effect on the time of production.

Experiments were conducted during 1986 under both greenhouse conditions and in the field at the Cornell Turfgrass Field Research Laboratory, Ithaca, N.Y.

Under greenhouse conditions the following factors were studied: two temperatures, three rooting media and two seeding mixtures. The temperatures selected would conform to cool conditions of spring and fall (70°F day/60°F night) and warmer summer temperatures (80°F day/70°F night).

Black plastic was used to line flats filled with one of the following organic materials: composted pharmaceutical residue (Lederle Laboratories, Pearl River, N.Y.), composted horse manure/stable waste (Saratoga Organics, Saratoga, N.Y.) or air-dried, aerobically-digested sewage sludge (Groton, N.Y.).

Seed of either straight Kentucky bluegrass (cv. Adelphi) or a mixture of 50 percent bluegrass and 50 percent perennial ryegrass (cv. All*Star) were mixed into the organic medium. Sod tensile strength and germination were determined periodically over the 90-day period of the study.

Composted horse manure provided the best conditions for germination. Within seven days, 50 percent germination occured; within 21 days, 100 percent. In comparison, the germination on the other two media ranged from 15 percent to 37 percent after 21 days. These differences in germination also carried over into sod strength (see table 1).

continued on page 66

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SOD *from page 64*

Table 1. Days to produce a harvestable sod (≥ 3.3 psi)

Seed Type*	Organic Medium	Cooler Temperature (60°F/50°F)	Warmer Temperature (80°F/70°F)
		days	
100 KBG	Composted horse manure	54-57	68-71
100 KBG	Pharmaceutical residue	68-71	82
100 KBG	Sewage sludge	82	—**
50 KBG:59 RG	Composted horse manure	54-57	54-57
50 KBG:50 RG	Pharmaceutical residue	54-57	54-57
50 KBG:50 RG	Sewage sludge	—*	82

* 100 KBG (100% 'Adelphi' Kentucky bluegrass, 50 RG (50% 'Allstar' perennial ryegrass)
** A "—" means the sod strength of ≥ 3.3 psi was not obtained over the 90 days of the study.

Table 2. Weeks to produce a harvestable sod (≥ 3.3 psi)

Seed Type*	Rooting Media	Seeding date, 1986 June 18	August 3	September 11
		Weeks		
100 KBG	Composted horse manure	17.5	—*	—
100 KBG	Pharmaceutical residue	11.5	7.5	—
100 KBG	Soil	—**	—	—
50 KBG:50 RG	Composted horse manure	10.8	9.0	—
50 KBG:50 RG	Pharmaceutical residue	8.0	5.3	—
50 KBG:50 RG	Soil	—	—	—

* 100 KBG (100% 'Adelphi' Kentucky bluegrass, 50 RG (50% 'Allstar' perennial ryegrass)
** A "—" means the sod strength of ≥ 3.3 psi was not obtained over the course of the study.

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Based on our equipment, a commercially suitable sod should have a strength of at least 3.3 psi. Under either temperature condition, Kentucky bluegrass sod could be produced within 57 days on composted horse manure and between 68 and 82 days on composted pharmaceutical residue. A harvestable sod (+3.3 psi) was produced faster on these two rooting media when a seed mixture of bluegrass and ryegrass was used. Sod production on sewage sludge was found to be slower and was related to a high soluble salt level in the sludge.

Using the greenhouse results, composted horse manure and pharmaceutical residue were tested in the field. Another treatment was included in the field, which was to seed the existing soil (Hudson silty clay loam) and manage it under conventional sod production methods. The time of seeding was used to replace the different temperature greenhouse. Seedings were made in early summer (June 18), late summer (August 3) and the recommended fall seeding (September 11).

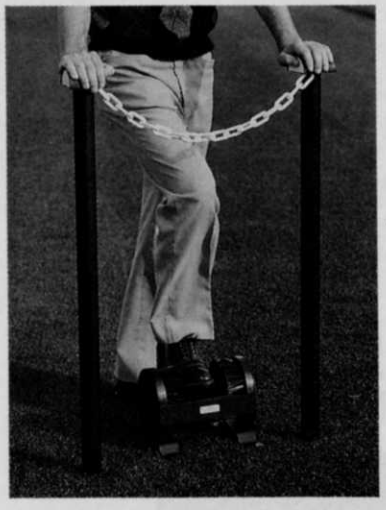
The best time to seed (see table 2) to produce the fastest harvestable sod was late summer (August 3), followed by early summer (June 18). The fall seeding did not result in a harvestable sod. Of the organic rooting media, pharmaceutical residue produced one to six weeks faster than in composted horse manure. None of the seeding in the soil resulted in harvestable sod in 1986, typical for soil seedings.

The late summer seeding was probably superior to other times for several reasons. First, it was very wet in August and September, which did not result in any drought stress normally experienced in late summer seedings. The fall was also very wet, cool, and winter arrived sooner than normal.

Pharmaceutical residue proved to be a better rooting medium than composted horse manure. This was true primarily because of both better fertility (higher in nitrogen) and waste relations. However, by itself, pharmaceutical residue was too soft for normal mowing equipment and required a fly mower.

Further testing is under way at Cornell to examine different rooting media under larger scale production (five acres). It appears that if mechanization of planting and harvest is done, the RIL System of sod production can either increase the total sod produced on the same acreage or keep the same production amount on less acreage.

To a consumer or producer of sod, the RIL System might offer a wider selection of sod in terms of species of grass as well as cultivars. The sod grower could have the ability to produce sod to a bid specification and supply "exotic" or more difficult to grow sods of cool season grasses like tall fescue (without bluegrass), perennial ryegrass and bentgrass.



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PROBLEM MANAGEMENT

by **Balakrishna Rao,** Ph.D.

Pruning azaleas

Problem: *We need some guidelines for timing and proper methods of pruning azaleas in Georgia. We have to deal with small to large, overgrown plants in different places. (Georgia)*

Solution: By proper and selective pruning, the size, appearance and flowering can be improved, and diseased plant parts can be removed. When azaleas are not pruned on schedule, they often tend to produce long stems without many branches and flowers. This can be corrected by "heading back" (reducing in length) and encouraging the development of several side branches. The ideal time for such pruning is soon after flowering to produce strong branching.

These plants should be fertilized and watered as needed to stimulate new growth. This new growth can be "tip pruned" (pinched) by early July so it can produce more lateral branches. This method will produce compact plants which will produce more flowers.

Dead and dying branches due to diseases or winter kill should be removed. For smaller branches use hand pruners, and for larger branches use lopping shears. Cut back into healthy tissues. For larger wounds, application of wound dressing materials may be beneficial.

When plants grow too fast and overgrow the desirable size, or when planning to move large plants to another location, they should be pruned properly to maintain their size and shape. Species of azaleas, like Southern Indian (Indica or Formosa type), grow fast and may require severe pruning. To minimize shock, severe pruning should be done three to four weeks before blooming. The growth produced after this can be further pruned to develop a compact growing plant. Small azaleas should be pruned several times during the growing season to produce a nice compact plant. Maintain good fertilization, watering, and pest management programs to ensure good growth and flowering.

Turf in shade

Problem: *What would be the best way to establish turf under large trees such as maple or oak? Is it better to cut roots and put down soil and seed or simply topdress with soil on existing roots and then seed? Which would be better? (Ohio)*

Solution: The two basic problems are shade and lots of surface-growing roots. Growing turf under trees, like maple and oak that have dense canopies, is possible. Selectively thinning the tree canopy will allow enough sunlight to penetrate through the tree to the grass beneath. Even a slight increase in sunlight may be enough to allow the turf to grow and remain reasonably thick. This process will have to be repeated every few years if the tree is a fast grower and fills in the open spaces.

If pruning the tree still doesn't provide enough sunlight to sustain turfgrass, then a shade-tolerant ground cover should be used in place of grass underneath the tree. Trees that develop surface-growing roots are doing so because of compacted soil and/or poor drainage.

Oxygen is the prime limiting factor in determining depth of root growth. Compacted or wet soils do not have the oxygen-holding capacity to allow roots to grow beyond a few inches of the soil surface. Cutting the roots will only result in more surface roots developing later. Topdressing will further stress the tree by suffocating the sensitive feeder roots.

As little as one inch of soil over the root system can kill the entire tree. Surface rooting is the symptom of a problem, so cutting the roots or topdressing with soil is only a temporary solution. Aerifying the soil with a coring machine or an auger will allow oxygen and water, as well as the root system, to penetrate deeper into the soil horizon. Not only will the growing conditions of the tree be improved, but it will also be easier to maintain turf underneath a tree without surface roots.

Tall fescue seeding

Problem: *We seeded some lawns under shady conditions with a good mixture of certified tall fescue seeds around the second week of September last year. Seeding was done with an aeroseeder and lawns were well watered after seeding and during establishment. However, we are seeing a large number of ¾-inch bare spots now. Will these areas fill in? Do we have to reseed now? Is it better to wait till spring? (Ohio)*

Solution: Since you have used certified seeds with a good percentage of germination and used an aeroseeder, you should have obtained good results. Several possibilities exist as to the cause of the problem you are experiencing. If the soil was not prepared well, some of the tree roots might have prevented proper seeding and establishment.

Another possibility might be that seeds were washed off or rotted, or the area remained dry at times. Tall fescues spread slowly by producing tillers, which grow laterally, resulting in a bunch-type growth habit. Because of this growth habit, ¾-inch bare spots may not fill in for a long time. To correct the situation you can consider dormant overseeding, or better yet, wait until spring and see how much of an area may need reseeding and then overseed. Maintain good watering throughout the germination and establishment period for better results.

Balakrishna Rao is Director of Lawn Care Technical Resources for The Davey Tree Co., Kent, Ohio.

Questions should be mailed to Problem Management, Landscape Management, 7500 Old Oak Boulevard, Cleveland, OH 44130. Please allow 2-3 months for an answer to appear in the magazine.

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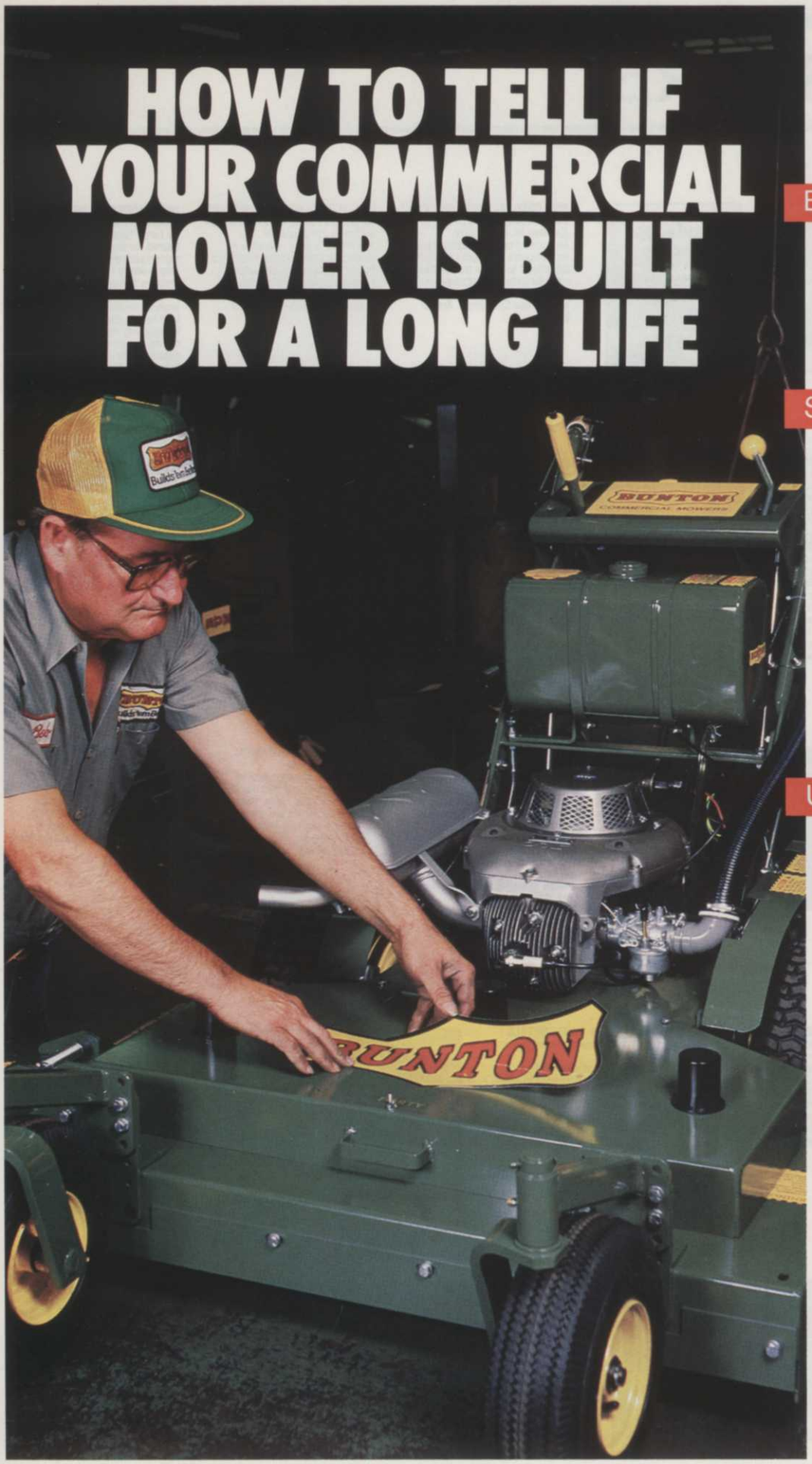

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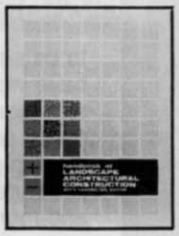

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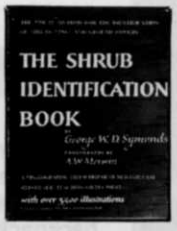

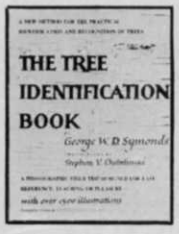

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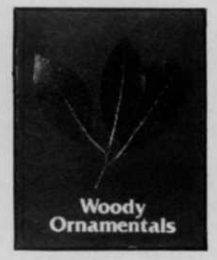

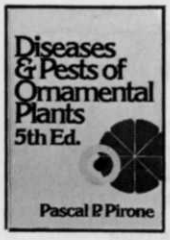

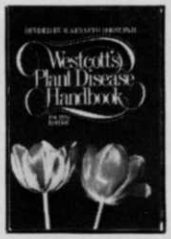

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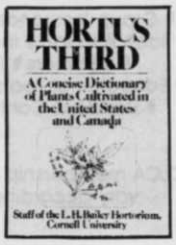
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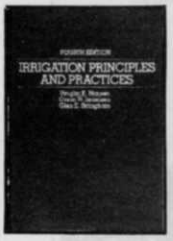

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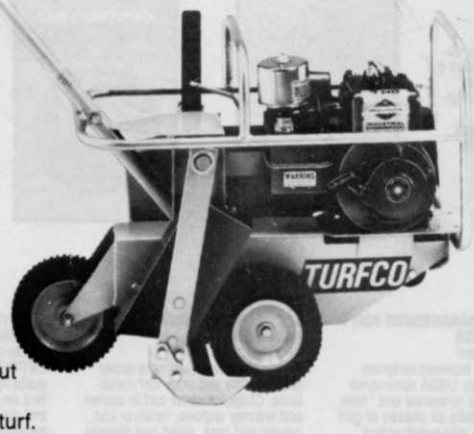

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EVENTS

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American Horticultural Society Annual Meeting, May 13-16, Omni Park Central Hotel, New York City, N.Y. Contact: Harriet Sweeney, AHS, P.O. Box 0105, Mt. Vernon, VA 22121; (703) 768-5700.

Western Chapter, International Society of Arboriculture Annual Conference, May 15-18, Santa Cruz Holiday Inn, Santa Cruz, Calif. Contact: Donald F. Blair, 1958 Latham St., Mountain View, CA 94040; (415) 967-4676.

North Carolina Turf & Landscape Field Day, May 20, NCSU Turf Field Center, Raleigh, N.C. Contact: J.M. DiPaola, Box 7620, North Carolina State University, Raleigh, NC 27695-7620; (919) 737-2657.

JUNE

Northern Michigan Turf Managers Association M.T.F. Benefit Day, June 8-17, Treetops Golf Course, Sylvan Resort, Gaylord, Mich. Contact: Tom Reed, N.M.T.M.A., 37333 Apollo Dr., Traverse City, MI 49684.

Arboriculture II Training Course, Warrenbrook Golf Course, Warren, N.J. Contact: William R. Oberholtzer, Cook College, Rutgers University, P.O. Box 231, New Brunswick, NJ 08903; (201) 932-9396.

Kentucky Cemetery Association Meeting, June 11-13, Ashland, KY. Contact: George W. Little, Jr., P.O. Box 43445, Louisville, Ky 40243; (502) 245-5996.

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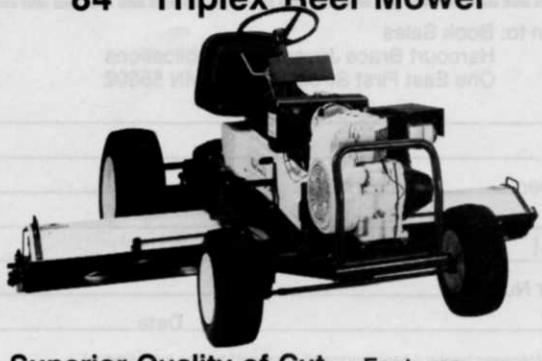

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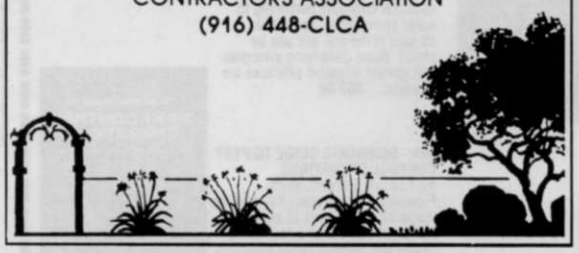

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MANAGEMENT: Ever-Green Lawns Corporation, a division of the multi-national Hawley Group, Ltd. is looking for experienced lawn and tree care professionals. Please respond in writing only to Richard D. Niemann, Corporate Recruiter, Ever-Green Lawns Corp., 1390 Charlestown Industrial Drive, St. Charles, MO 63303. TF

LANDSCAPE MAINTENANCE FOREMEN NEEDED: Expanding commercial landscape maintenance firm servicing Dallas/Ft. Worth areas. Knowledge of industry a must. Send resume to: **GROUNDS TECH INC.**, 2036 Bedford Road, Bedford, Texas 76021. 5/87

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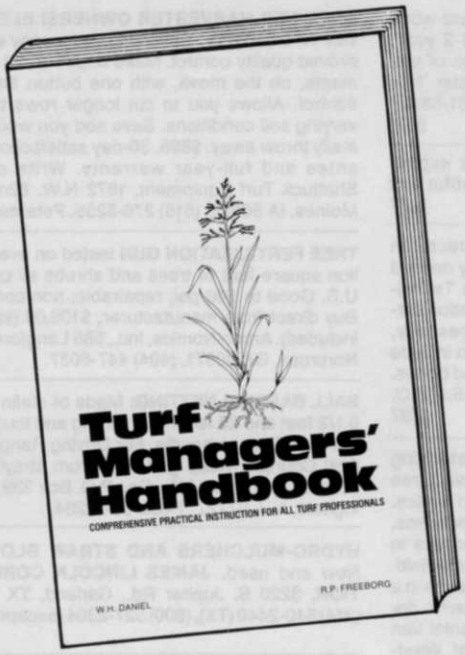

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Boulevard Mix	Any area with high pH (roadsides, sidewalks, boulevards, alkaline soils, etc.).	Contains 'Fults' and Dawson red fescue for beautiful salt-tolerant turf. Performs at low to high fertility levels.
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Overseeder II Mix	Fairways, tees, athletic fields.	Rapid germination and establishment. Withstands heavy traffic and resists diseases. Penetrates compacted soils.
Medalist North Mix	Fairways, tees, cart paths, wear areas.	Quality turf for high traffic areas. Clean mowing and disease resistant.
Premium Sod Blend	Commercial sod production.	Exceptional dark green color. Tolerates light shade. Superior disease resistance. Rapid sod producer.
Renovator Pro Mix	Problem solver for heavy traffic areas (athletic fields, golf tees, and fairways).	Penetrates compacted soils and combats *Poa annua.* Adaptable to most geographic regions.
Medalist Brand Overseeding Products	Winter overseeding of dormant bermudagrass.	Establishes rapidly and evenly. Tolerates traffic while providing a superior putting surface. Smooth spring transition.

Ask your Northrup King distributor about Medalist Turf Products to solve your turf problems. Or write Northrup King Medalist Turf Products, P.O. Box 959, Minneapolis, MN 55440.

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IF YOU'RE STILL USING CONVENTIONAL PESTICIDES, BE PREPARED TO HEAR OPPOSING ARGUMENTS.

Despite mounting evidence of the drawbacks of conventional, *petrochemical-based* pesticides, some companies continue to use them. Yet consider the situation that exists.

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Dressing for failure

The scene is a major turf convention. The speaker asks a crowd of 70 or 80 landscapers how many issue uniforms to crew members. About 40 raise their hands.

If you think the above scenario is an accurate portrayal of the green industry's professionalism, you've got rocks in your head. Want to know how many landscape contractors *actually* raised their hands? Seven...maybe eight.

Keep in mind that this is a *major* turf convention. About 30 percent of the attendees were from out-of-state, an indication that they ran a business profitable enough to send somebody to a convention of this magnitude. We're talking about moderately successful business people here. Yet most didn't supply uniforms.

This bowls me over. If I were in a position to hire a landscape management company to handle my residential or corporate lawn, the last thing I'd want on that lawn would be somebody riding around on a lawn mower in a T-shirt and cut-offs. And you'd better believe that I'd never allow somebody like that around my house while I'm away during the day.

Okay, so you've got a nice profitable company, even though you could care less about uniforms. But have you ever considered how much *more* money you could be making if your employees radiated that confident, professional look uniforms provide?

If you haven't checked out the article in this month's issue about Torre & Bruglio Landscaping, you should. Here are two guys who do it right. They're two guys who are also reaping the rewards of "doing it right." If you don't dress your employees properly, you might take a hint from this multi-million-dollar company.

Jerry Roche

Jerry Roche, editor

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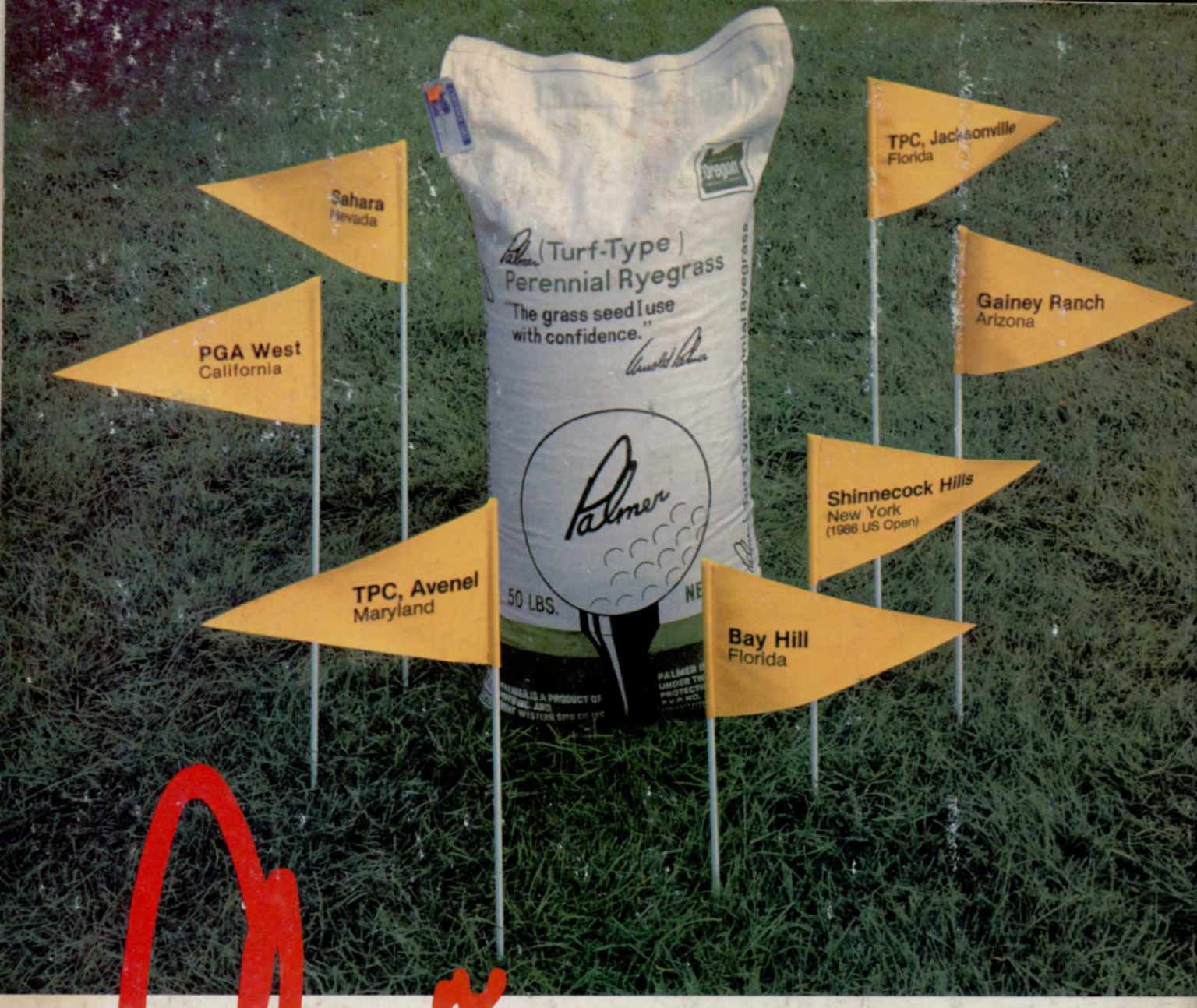

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